PREHISTORY

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PREFACE

A TEXT-BOOK of prehistory cannot be regarded at the present time as quite like any other text-book, for it is concerned with a new and very undeveloped science whose methods have not yet been perfected and unified: even its main lines have not yet been clearly laid down. The fact is that prehistory has been subjected to severe criticism, while many men of culture and science look on it with suspicion and hesitate to allow it the name of 'science.'

To begin with, therefore, we shall have to justify its methods and show that there really is a science of prehistory, whose procedure of research and inference enables us to reach a measure of certainty comparable with that attained by the natural and historical sciences.

We have two great dangers to avoid. The first is that of confining prehistory to the western part of the Old World. This has been too much the custom hitherto, first of necessity, through lack of documents, and then from habit. Human development has had the whole world for its theatre, and it can be traced only if our researches are similarly world-wide.

The second pitfall is that of trying to construct a general science of prehistory by first laying down the main lines and then setting the facts inside the framework thus obtained. That method is suitable enough for a science that has reached maturity, but in this case the only solid materials at our disposal are a strictly limited number of observed facts: the main lines remain more or less

hypothetical. It would be quite unreasonable, therefore, to build an edifice whose framework is made of unstable elements, so that good materials are placed upon doubtful ones. It is better to set down the facts and learn to wait than to let the imagination build structures that will be more of a hindrance than a help towards the correct understanding of new facts. For this reason we shall adopt a purely geographical basis for our studies, leaving the facts in the setting where they were observed.

We commence with an introduction dealing with definitions, with methods, with the search for documents and their interpretation, and finally with prehistoric technology. Then we shall devote Part II to the principal prehistoric data in Western Europe. This is not, of course, because our own lands played a predominant part in prehistoric times, but because researches there are in a far more advanced state than elsewhere. The classifications made in these regions are universally known and provide a ground of comparison for new studies, so they must be known first. We shall next (Part III) examine in succession each of the great continental masses, divided into regions which seem to possess a certain geographical and historical unity. In default of direct prehistoric data we may provisionally admit that classification, since it is the one that is most likely to have remained valid throughout the ages. In each of these regions, however, we shall be able to touch on only a few principal points, but the framework will at least have been drawn up. In conclusion we shall take a general glance over the whole field to see what has emerged and note the appearance of certain main lines.

A. V. DE P.

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PART I
INTRODUCTORY

CHAPTER I
DEFINITIONS AND SCOPE

ALTHOUGH the term *prehistory* is etymologically clear enough, there is not complete agreement as to its exact meaning. In its widest sense it should denote the study of everything that relates to man before the appearance of written documents. But part of this domain is usually treated separately and given the name *protohistory*—the part relating to peoples of whom we have knowledge through the medium of neighbouring peoples who had reached the historic stage before they themselves had any written records: the Gauls and Germans in the centuries preceding the Roman conquest are a case in point.

Again, the study of human skeletal remains may be regarded as belonging to the domain of palæontology, and it is reasonable to apply to it the term *human palæontology* since it is carried on in the same way as the study of other living beings that have now disappeared. The same term has sometimes been used to cover the study of everything that relates to men of a certain antiquity, including their industry, art, and so forth, as well as their bodily characteristics, in which case the whole of the most ancient part of prehistory has changed its name. But the limits of the period in view do not seem capable of being fixed except in a very arbitrary manner: they will depend on whether we take as our criterion geological events, alterations in

the fauna, or changes in the human race, and that too in some specific region. Besides, the term human palæontology loses its logical basis if instead of studying man, like animals, in his physical aspect we study him in a special manner, from the point of view of his mental characteristics and the things he produces.

Finally, there still exist—and not long ago they were even more numerous—peoples occupying vast territories who have never had written documents, so that they represent contemporary prehistory. They are not usually regarded as prehistoric, however, and they are left to students of *ethnography*. So there is but one sphere, arbitrarily delimited and yet ill defined, to which prehistory is in practice confined, by a kind of tacit agreement.

As far as comparatively recent periods are concerned —those that belong to what geologists call the present day —the study of the environment of prehistoric man is fairly easy in terms of what is to be seen to-day. But it is different in the case of more remote periods, for then the climate, the fauna and flora, the shape of the earth's surface, the level of the sea, and the size of glaciers and rivers were all different. The study of environment becomes, therefore, a thing of enormous extent, and belongs to geology, palæontology, and palæobotany. But it is none the less indispensable, for the more primitive the stage of man's development the more closely is his life conditioned by his environment.

Even if the prehistorian desired to restrict his studies to the order of development of human industries he would still need recourse to all the sciences that can supply him with chronological facts. But how far is prehistory to annex the sciences of geology and palæontology, whose studies it needs? Or rather, which parts of these sciences are to be regarded as inextricably bound up

with prehistory? That is a question that has never been definitely settled. We see, therefore, that, however simple it may seem at first sight to define and demarcate prehistory, it is none the less a complicated problem that has received both varied and vague solutions.

It will be objected, perhaps, that these are merely questions of terminology and of no real importance. But that is not the case, for this imperfect demarcation of the work to be done, this lack of precision as to ends and means, are the sign, if not the cause, of the uncertainty as to methods and the incomplete and sporadic nature of prehistoric studies. Let us hope that in the near future the subject will be made more precise and the science of prehistory will reach maturity.

As a matter of fact, there could be almost as many sciences of prehistory as there are sciences concerned with man's present-day activities, and working on the same plan. Each element of material life, the various industries, hunting, agriculture, stock-raising, etc., the major and minor arts, sociology, beliefs, as well as ethnology and geography—all these things might be subjects of special study for the prehistoric period.

We have not yet actually reached that point. The facts that we are able to learn about the past are too few, and the dim rays of light that they throw need first to be combined into a general illumination. So it seems as well to keep under the general title of prehistory all studies that relate to the origin of man and the stages of his physical and moral development before the advent of historical documents in each region of the globe. In the forefront should be placed for each epoch and in each country the study of environment (fauna, flora, and climate), the physical study of the human body and the question of races, and the study of intellectual and moral

manifestations, including industry and art, social organization, and religious rites. This programme may appear alarmingly extensive and ambitious, but it has been proved that with a more limited scope prehistory cannot make progress: it comes to a dead end; it marks time; it sinks into quicksands. To attack all the problems along the whole line is the only way to reach a solution.

CHAPTER II

METHOD

HAVING defined the principal aims of prehistory we can now consider the theoretical means of attaining them, and then see what has been actually done and what yet remains to be done. There are two main lines of approach to this problem.

A. **Extension of Historical and Archæological Research.** It would seem that before history began with the first appearance of written documents there was always a period when memorable events, things of greatest moment to the community, were preserved by oral tradition. To add to the dignity and charm of its recital and to facilitate the task of memorizing it, this tradition was usually transmitted in musical or rhythmic form. The historic period retained these songs and poems, of which the Scandinavian sagas and the Homeric poems are examples. They constitute a source on which we can draw for information, provided, of course, that we use all the precautions dictated by wise methods of criticism.

Another thing which has caused certain customs or technical methods to be carried forward from a remote period into another quite different one is religious conservatism. Thus among the peoples of antiquity—Egyptians, Hebrews, and Romans—the use of stone knives for certain ritual acts such as embalmment, circumcision, and sacrifices, and the interdict upon iron or upon all metals regarded as unclean for certain sacred buildings were survivals from a forgotten past.

In the same way we have a source of information as to

relations between certain prehistoric peoples in the survival of language. There was at one time a disposition to draw more inferences from linguistic study than it could properly yield, but to-day we are inclined to neglect the useful hints that it is in a position to provide.

Furthermore, to complete the historical data researches have long been made already among the ruins of cities and in tombs for the material remains of ancient civilizations. The art and technology of each country and epoch have thus been revealed and the science of *archæology* has been created. It originated as a handmaid to history and was first studied by historians, but it has now acquired its own methods of research and inference. It can therefore continue its work in connexion with periods before history, even without the assistance of the latter. It will continue to excavate the sites of human habitation, to collect all indications of technology and art, and to study the development of these manifestations of the human spirit. Knowing, for example, the importance in historic communities of two kinds of facts—those relating to commerce and those relating to war—and seeing what material traces they leave behind them, the archæologist will be able to discover traces of this nature in the prehistoric domain. He will find out what trade routes were followed from the distribution of manufactured objects whose centre of production he has discovered, or of such precious commodities as amber and tin whose sources are known, and it is a recognized fact that ideas follow merchandise and that trade routes have been the paths of civilization.

The other important form of cultural penetration is forcible invasion, and this too has left characteristic traces in the destruction of cities, the erection of new buildings, changes in burial rites, the introduction of new kinds of tools and weapons, and the bringing together of different

races. All such things can be discovered by the methods of archæology.

In the lands of ancient civilization, such as Egypt, Greece, and Italy, this archæological method is the one that has generally been used in approaching the problem of origins. So too in countries not far removed from their prehistoric period, like Scandinavia, the extension of history is the path first followed by researchers. This method would seem to be a logical application of the scientific principle of proceeding from the known to the unknown, but it is applicable only to a period that bears, on the whole, some resemblance to the historic period, and those who follow this path will see the problem of origins ever receding as they go along it, and finally escaping them.

B. **The Search for Earliest Origins by Geological and Palæontological Methods.** The natural sciences that delve into the most distant past of the earth seem to be marked out as guides to lead us as far as is necessary in the search for human origins. By building up the history of earth changes and the variations that have taken place within the vegetable and animal kingdoms in the course of ages these sciences have perforce encountered man in the field of their studies and may therefore consider that he belongs to them. Some naturalists studying fossil man like any other animal species, that is to say from the point of view of their bodily form, have come to believe that they have got to the root of the problem—a well-known optical phenomenon by which every one magnifies the importance of his own science. But in the present case it is certain that the study of man's morphological characteristics, useful and indispensable as it is, cannot be more important than, and *a fortiori* cannot replace, the study of the creations of man's intelligence.

It must be concluded, then, that the study of ancient

man will have to include two perfectly distinct parts, for we know very little of any connexion that may exist between them. These are the study of man's bodily form, which in practice means his skeleton, and the study of his mental qualities, which in practice means his achievements, his industry, and all traces of his activity. This task will involve first the *search for documents* and then their *interpretation.*

Speaking generally, the documents made use of in prehistory are similar to those of geology, palæontology, and archæology. A document is not merely an object in the shape of organic debris or an instrument made by human hands (sometimes called an *artifact*): the document is the observation of facts relating to an object. For example, the fact that a certain tool was associated with certain others in a certain place and in a certain geological stratum is a document: a cut flint with no indication of its source and level is of scarcely any interest.

We shall therefore have to be careful to collect only complete documents and learn how to seek for them. Every search carried on without complete observations is a waste of documents that is scientifically blameworthy. And in order to conduct our researches under the best conditions we shall have, in practice, to know beforehand the kind of interest that attaches to documents and the way in which they can be utilized. For that reason we shall deal first with the interpretation of documents and then return to the subject of searching for them.

Interpretation of Documents

The great law that guides all interpretation of documents, in prehistory as in geology, is *the law of existing causes.* Thus the resemblance between ancient terranes

and those that are seen in process of formation to-day leads to the conclusion that the mode of formation is the same in both cases. We attribute to ancient rivers or glaciers the detrital formations that resemble the deposits formed nowadays by streams or glaciers. So also the resemblance between ancient animal forms and existing types leads us to infer a resemblance between the functions and manner of life of the two kinds. This great geological law, without which we should have to renounce all knowledge of the past, may lead to error if it is applied too crudely in matters of detail, but it seems to be the expression of a primordial truth—the principle of the unity and continuity of creation.

The documents of human industry, like those of geology, will be studied in the light of our knowledge of the world of to-day. When a stone implement is called an axe or a knife we are comparing it with a modern axe or knife. Within limits the comparison seems to hold good, but none the less such comparisons may give rise to error because of the wide differences between our industry and manner of living and those of prehistoric times. On the other hand we sometimes observe an actual identity between certain pieces of equipment, household fittings, etc., of existing 'backward' peoples and certain prehistoric tools or dwellings. It seems certain, therefore, that the most useful and valid comparisons are those between the state of affairs in ancient times and that existing to-day among 'savages' or primitive races. *Ethnography* will be the proper guide to prehistory in all that relates to material life. It will be very useful also in respect to moral and social life, but comparisons and deductions in this sphere will need still more caution and criticism.

It appears from all this that the prehistorian needs to know geology, palæontology, zoology, anthropology, and

ethnography, while other sciences such as geography, history, and sociology are also cropping up constantly in his studies. Now at the present time there is no course of teaching that covers this programme, for there is no school of prehistorians: they are drawn from very varying intellectual surroundings according to circumstances and individual tastes, and each has to complete his preliminary training by self-tuition, so as to have the indispensable minimum of knowledge in all useful sciences. He must have a sufficient acquaintance with geology to study for himself the nature of the deposits where his discoveries lie. He must know enough of ethnography, materials, and technology to study ancient tools and dwellings, which belong strictly to his domain. As for the other branches—anthropology, palæontology, and zoology—for which he is entitled to count on the assistance of specialists, he must have a sufficient general insight into them and enough knowledge of some kinds of particular facts to be able to utilize the crude results of his studies, *i.e.*, to draw the conclusions that they admit of. For instance, after identifying the animal species found in a certain deposit he will have to understand what this local fauna means for contemporary man in the matter of climate and conditions of life, to compare these results with those of other researchers, and so forth.

Let us consider in a concrete manner how problems of interpretation arise in each of the scientific fields just mentioned.

Interpretation of Geological Documents. The nature and position of a stratum containing prehistoric materials will furnish various kinds of information as to the period to which the latter belong. In the first place, the stratigraphical *position*, *i.e.*, the order in which different strata are placed vertically upon each other, shows the

relative antiquity of the strata. Stratigraphy is the foundation of our knowledge of the chronological order of facts and the source of indisputable information on this subject: we have only to avoid certain chances of error to be mentioned later.

The *nature* of the stratum indicates the way it was formed, whether it is fluviatile (river-formed) or æolian (wind-formed), etc. Its situation, breadth, and thickness enable us to judge, up to a point, the state of its surroundings at that period. Thus a strip of sand and gravel clinging to the sides of a valley shows the extent to which the valley was hollowed out. The nature and size of the materials and the thickness of the bank will enable us to conclude, for instance, that the stream was much swifter and wider than it is now, and therefore that atmospheric precipitation was heavier. Alluvial strata will indicate by their physical nature the causes that formed them —wind, running water, etc.—and the probable nature of the climate and appearance of the country at the time they were formed. From rock fragments that are foreign to the district where they are found and that bear certain marks it will be possible to discover their source and the agent that carried them: it might, for instance, be a glacier, or floating ice from a glacier reaching the sea.

Interpretation of Palæontological Documents. When specialists have identified species it remains to draw conclusions from them about man's environment. It has often been thought sufficient to draw very simple conclusions, such as identifying the ancient climate with the present climate of lands inhabited by the same or similar animals. But attention must be paid to the following points. It is a mistake to judge a fauna from exceptional features, regarding them as characteristic. It is the fauna as a whole that should be used to characterize

the living and climatic conditions. Thus at the present time the reindeer is the only large terrestrial mammal in the extreme north of the Eurasian continent, and it is met with in the fauna of certain periods in France. But it must not be concluded that for the whole of that time the climate of France resembled that of the regions where the reindeer lives to-day. In some of these periods, indeed, we find associated together the reindeer, the red deer, the ox, the horse, and so forth, so that the climate must have been endurable to all these species together.

We must also take into account that some species or simple varieties of animals, now extinct, may have been suited to different climates from those in which kindred species or varieties are found to-day. We know that there existed elephants and rhinoceroses adapted to cold countries—everybody knows the long-haired mammoth—while nowadays they belong to hot ones. It is less well known, as Joleaud and Stehlin have both pointed out, that the hippopotamus itself has been represented in lands that are scarcely even temperate. In the eighteenth century there were hippopotami in all the rivers of South Africa, frequenting the seashore and living in a climate where the temperature falls sometimes below zero.

The disappearance of an animal species by emigration or extinction has not always any climatic significance, being often due to destruction by other harmful species, especially man.

Account must be taken also of seasonal migrations which may have been habitual with some species. In hilly districts in particular it arises now and again when the low-temperature fauna of the heights invades the lower regions. In these countries, too, we must reckon with the transportation brought about by the hunters themselves.

Interpretation of Human Skeletal Remains. Although the study of osteological documents is a matter for specialists, the prehistorian must none the less be able to form his own opinion from the results obtained by anthropologists and to discuss them in order to reach general conclusions. The study of anatomical features, leading to the observation of certain peculiarities, whether developments or atrophies, yields information as to the aptitudes and habits of the creature under examination. Thus from the appearance of the vertebræ, the tibia, and the femur of what is called Neanderthal Man, it has been possible to infer that he had a not quite upright posture, with the body leaning forward and the legs slightly bent. The cranial features are particularly important, since the head is the seat of the nervous and mental activity on which most human development depends. It is the task of the anthropologist to define these features, to find a way of measuring or describing them, and to pick out the most important and determine their significance. A fossil skull will be classed according to these features as they occur in objects available for comparison at the present day, *i.e.*, the skulls of different human races and their nearest neighbours, the anthropomorphous apes. This method is fortunately made possible and valuable by the fact that most of the essential features—viz., the development of the brain in relation to the face, the position of the occipital foramen, the characteristics of the teeth and jaws, the development of the superciliary ridges, and so forth—vary, concomitantly. The consequence is, therefore, that a fossil skull can be placed in a morphological series with scarcely any possibility of doubt. When this has been done two important questions arise:

(1) If a skull is morphologically intermediate between two others belonging to different species, can it be inferred

that the faculties of the species to which it belonged have the same intermediate character? This has often been taken for granted, but it is somewhat doubtful.

(2) If fossils when spaced out at chronological intervals form a continuous morphological series, should this be regarded as an evolutional series? It was at first assumed that it should be, but the development of palæontological knowledge has shown that this was wrong. Forms less developed and more ancient than the one in question may be its ancestors, but they may equally be collaterals that have not developed and have become extinct. The question can be settled in each case only by the discovery of a sufficiently large number of instances.

An example will show how this works out in practice. There was discovered in Java in 1891 a fossil form that takes its place in relation to existing forms between the anthropoid apes and man. It was named *Pithecanthropus*. This form has to be placed somewhere on the vertical date line, and in accordance with the theory of evolution, which seems to-day the only admissible theory, it should be attached to one of the branches which terminate in existing forms. There are then three possible hypotheses, as follows:

(1) The form P. may be placed on the evolutional line that ends in man. This hypothesis, by which Pithecanthropus is the ancestor of man, was adopted by Dubois, the discoverer of the fossil in question.

(2) The form P. may be attached to the human evolutional line like a twig on a branch. This hypothesis has been adopted by many naturalists, especially Keith and Osborn.

(3) The form P. may be attached to the evolutional line leading to the anthropoid apes. This hypothesis has been adopted by Volz and Boule.

Those who hold these different hypotheses have of

course put forward arguments in support of their respective views, but without arguing the matter with specialists whose knowledge and authority command respect, we may remark that their very disagreement is enough to show how impossible at present is any interpretation that

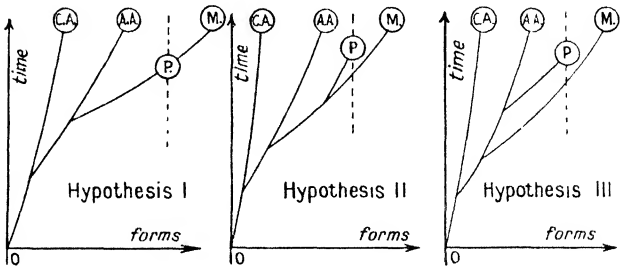

FIG 1. DIAGRAM ILLUSTRATING THREE POSSIBLE HYPOTHESES AS TO THE POSITION OF PITHECANTHROPUS (P.) IN RELATION TO ANTHROPOID APES (A. A.) AND TO MAN (M.)
C.A. = cynomorphic apes.

is likely to be the true one. Before drawing a curve through points one must have a large enough number of points, and in this case we should need enough forms to mark out the evolutional lines that are left to our imagination.

For interpretations of a more general order the great biological and evolutionary laws, so far as they are known, may lead to conclusions otherwise unattainable. That has been shown in a masterly manner by Cuénot.

Interpretation of Traces of Human Activity. This interpretation belongs of right to the prehistorian, and is the central part of his work. It requires varied knowledge, an imagination systematically directed towards using that knowledge in the consideration of all possible cases, and lastly a keen critical sense. Let us

consider, by way of example, the principal cases that arise.

Fire and Dwellings. Signs of human habitation are frequent enough in the form of ashes or charcoal, earth prepared and dug for the building of light structures, and the ruins of such buildings. They can generally be interpreted quite easily in the light of ethnographical facts. But in some cases of great importance for the history of human development we may hope to draw decisive indications from observation of the remains of hearths. Man is not the only living being to prepare a dwelling-place for himself, but he is the only one to use and maintain a fire. It would be an exaggeration to make this a criterion of the genus *Homo* as some would like to do, but none the less if there existed a stage of industrial development so rudimentary that the things used as tools, whether of stone or otherwise, show no definite marks of having been worked, then the existence of this industry could, if it were found in the neighbourhood of a hearth, be proved, instead of being merely presumed and affirmed in the name of some kind of logic.

Besides piles of ashes, fire has left other recognizable traces such as crackled flints, reddened limestone, and partially calcined bones. We must beware, however, of interpreting all traces of fire as marks of human activity, as was done formerly, for natural fires started by lightning or by volcanic action have also played their part: this kind can often be distinguished by the extent of its effects.

Stone Industry. Tools and weapons of stone are often the sole remaining traces left by men who have disappeared. They can be studied from different points of view according as we see in them (*a*) the presence of human workmanship (this is generally obvious, but in the case of certain rudimentary tools it is a matter for

discussion, as we shall see in connexion with technology); (*b*) the purpose of the object (if we can decide how the various kinds of implements or weapons were used we can deduce some information about the conditions of life at the time they were made); or (*c*) the distinctive features of each industry (these can be sought for either in the existence of certain special 'characteristic' types or in the appearance of the whole industry, taking into account the relative proportions of the different types).

From these features of the industry an attempt is generally made to draw two kinds of conclusions: on the one hand as to the degree of perfection attained and the level of civilization reached, and on the other as to the relation of the industry under consideration to other industries belonging to other places or other periods. In this way the effects of influence and the facts as to filiation and development will be discovered.

An entire school of prehistoric study, of long standing, has carried to very great lengths interpretations based on *typology*. We shall call attention in connexion with the archæological method to the principal difficulties that it encounters and that it has sometimes been unwise enough to neglect.

Bone and Pottery Industries. The general observations just made in regard to stone industries obviously apply also to those of bone and pottery. It should be noted that the study of bone workmanship according to visible marks on the objects—sawing, scraping, etc.,—may provide a little information about the working of wood, of which there are practically no remains. In other respects, such as polishing, it is connected with the working of stone.

The discovery of pottery has often been regarded as marking a great step forward in development because it appears only at the end of the Stone Age. But it is to be

noted that there are whole populations to-day who know pottery quite well but make no use of it because of its fragility: such are the nomadic peoples, including the Tuareg and the peoples of the Asiatic steppes. Of tribes dwelling near each other and of the same race and culture, like the Kanakas of the New Hebrides, some have adopted the use of pottery while others have not. Again, the skins of animals and the coverings of certain fruits, such as calabashes, nuts, etc., make very useful containers, while beautiful and substantial ones can be made by proper workmanship out of wood. Liquids can easily be heated in any kind of vessel by putting in heated stones. The practice of boiling food is repugnant to many primitive peoples, who find water cookery tasteless and unpleasant and prefer their food roasted or braised. It would seem, then, that pottery must be looked upon mainly as a characteristic—we might almost say a symbol —of the settled life. It is in this respect, and therefore indirectly, that its appearance or its development will mark an important stage in the progress of humanity.

Burial. The practice of burying the dead with some care, and especially the inclusion with the body of useful objects, such as provisions, weapons, and tools, seems the clearest indication of the idea of survival and of animistic beliefs. But besides this general indication the study of burial rites, which varied greatly in different times and places, may yield proof of a certain unity of belief among peoples of a particular geographical region at a given period. We have only to think of the present state of affairs to avoid interpreting this unity of belief as indicating unity of race, of grouping, or of material civilization. At the same time it does imply some resemblances and it raises a presumption of the existence of other bonds to be looked for.

Representational Art. Representational art seems to be connected with various faculties and feelings. In its realist form it is an expression of the imitative tendency that is one of the most characteristic traits of men and apes. In its decorative or geometrical form it corresponds to the taste for rhythm more usually expressed among living beings in music. Birds, in which this desire is strongly developed, have sometimes also a taste for decoration, arranging flowers around their dwellings, and so forth.

The fact that art appeals to the feelings and is one of the things most directly accessible to all men makes it particularly difficult to study by the method of logical reasoning. Artists, therefore, paradoxical as it may seem, must be regarded as not qualified to study art in general. They feel more than they reason, and they can feel only through their temperament, which is formed by the conditions of race, environment, and tradition that are proper to them. Thus they run more risk than others of confusing the expression of their personal feelings with the truth about the feelings of these ancient artists.

The best information as to the origin of these artistic tendencies and the form of their earliest expression is to be obtained from the study of the psychology of animals and undeveloped human beings. The idea of finding traces of this origin in the past, however natural, is almost too fantastic to be entertained: it would mean searching for something infinitely small, a point in space and time. There is little chance of finding anything but manifestations of an art already long in existence.

The question of the motives that actuate art has often been discussed, and two opposing explanations are offered. Civilized moderns, especially artists, think that art suffices to itself and corresponds to the simple satisfaction of an intellectual need: this is the theory of "art for art's sake."

Students of ethnography, on the other hand, generally become convinced that primitive art is always charged with a certain meaning and has a utilitarian character in the psychic realm. In the eyes of a primitive man the imitation of a living being contains something of that being, something that can be acted on and that reacts in turn on the living being himself, providing a practical means of indirect action—the foundation of magic. We reach thus the theory of utilitarian art and its origin in magic.

This explanation has the merit of being based on facts observed in surroundings that are most nearly akin to those of primitive man. The theory of "art for art's sake" has in its favour the value of the thought of its exponents, the weight of their authority, and examples drawn from among highly developed men. Its advocates have sometimes argued that if art were originally magical and utilitarian the artists would have been content with rough sketches, and that the search for æsthetic effects shows a disinterested attitude. But the search for the beautiful in building a house or making some article does not mean that the house was not built for shelter and the article not made to serve a practical purpose.

It seems almost certain, then, that every work of representational art should be interpreted as proceeding from a double motive. There is first the utilitarian purpose, such as the desire for a magical effect, the preservation of a memory, the transmission of an idea, and so forth, and then there is the satisfaction of an æsthetic instinct. But whereas among highly developed civilized men the second motive is so important that it is almost the only one, the opposite is the case with primitive men at the present time.

On the other hand, the spirit of imitation, which is so

primitive that it exists among apes, requires, if it is to be expressed in representational art, the intervention of a faculty of abstraction that seems to be the mark of very advanced mental development. We may judge, therefore, that this faculty and its results are unlikely to be anterior to the animistic conceptions that give rise to magic, but that, on the contrary, art was created for the service of other interests, as we find to be the case still among the less developed peoples.

CHAPTER III

THE SEARCH FOR PREHISTORIC DOCUMENTS

WE have already stated that prehistoric documents should include in their entirety the whole of the facts relating to the objects collected. A few concrete examples of the commonest cases will show how this works out in practice.

DISCOVERIES ON THE SURFACE

It is evident that objects belonging to very different periods may be found together on the ground. Discoveries of this kind have therefore often been completely banned in the name of science: there is no information to be obtained, it is said, from an object picked up on the ground. Yet prehistoric materials found below the surface are rare in comparison with those found on it. Our sources of information, also, are too scanty for us to afford to neglect any of them. Instead of rejecting all surface finds we should endeavour to get something from them, and this can be done if we devote sufficient time and method to our researches to bring into operation the law of large numbers and thus obtain probabilities that increase up to the point of practical certainty.

If we find in a limited area a certain number of types of stone implements there is a slight presumption that these types belong to a single period when the place was inhabited. It is also possible that the place was occupied on several occasions or during a period of time corresponding to several industrial periods and that we are collecting a mixture of objects belonging to these different

periods. Yet if the same thing occurs twice, or three times, or *n* times—*i.e.*, if the same industrial types are always found together, it becomes entirely improbable that the superposition of habitational areas should yield the same mixture *n* times out of *n*.

Discoveries below Ground: Stratigraphy

The debris of all kinds that man has left on the ground has sometimes been covered up by one or more layers of earth. This is a kind of natural sealing up process that secures these industrial and faunal remains against subsequent admixture. When these upper layers or strata contain each a different industry and fauna we can tell in what order these industries and faunas succeeded each other. Thus stratigraphy furnishes us with *relative chronology*. It has long been customary to compare prehistoric deposits to a book—the book of the past—whose leaves are the strata. But one peculiarity must be noted: this book can be read only by destroying it. It is therefore imperative to make the reading as correct and complete as possible and to put it into writing at once. The easiest deposits to excavate without error are those in which the layers of human remains are separated from each other by what may be called barren or sterile layers containing no such traces.

Apart from caves, which are obviously marked out for the attention of investigators, almost all deep-lying deposits have been discovered by chance. It was during surveying and digging operations for canal construction that Boucher de Perthes discovered the first implements of Quaternary man at the gates of Abbeville. Later on the sand and gravel quarries of Saint-Acheul, near Amiens, and then the ballast pits of Chelles for the use of the Eastern Railway yielded materials that served to

mark out the principal primitive industries. Since then it has always been the same, so that it is important that a watch should be kept on all operations that penetrate the Quaternary epidermis, so to speak, of the earth. Experience has shown that this supervision can be practically and effectively carried out only by educated persons who are interested in discoveries of this kind and are spread over the whole area. Doctors, clergymen, teachers, and colonial administrators, who form a network over the country owing to the nature of their duties, should all have their attention drawn to the usefulness of this *rôle*, even if they confine themselves to reporting discoveries to specialists who can come and study them. The prehistorian who sees a trench opened should examine it and study it as if it were dug for his own special benefit.

All this explains why documents gathered from below ground are so rare in new countries. In such regions we must wait for future road and railway construction on a large scale in order that discoveries may be made.

A. **Searches in River Alluvium.** The *erosion of valleys* is a general phenomenon invariably produced when the level of a river-mouth does not change. The stream wears away the soil on which it flows and thus digs its bed by seeking to find its own level. It can never actually succeed in doing this, but once it has attained a certain form the process of erosion almost ceases. Moreover, by its alternate rise and fall the river washes down debris of varying sizes—sand, gravel, and clay—which it deposits at certain points in its course, then re-arranges, and so forth.

If the erosion of the river-bed were carried out in a straight line the deposits would all be washed down uniformly. But what actually happens is that the winding of the stream causes it to wear down its banks: the bed is thus hollowed out in a twisted form and parts of former

deposits are allowed to remain. The result is that strips of fluviatile formations are left clinging to the sides of the valley at different levels indicating the various steps in the erosive process (Fig. 2). The oldest deposits are therefore the highest. It should be noted here that this is contrary to the law of stratigraphy, but it is evident that there is no real contradiction, for this is not a matter of stratigraphy: the river deposits are echelonned on the same slope, not superposed on each other in the same vertical plane.

When a *change occurs in the base level—i.e.*, in the level of the sea which the stream reaches, directly or indirectly —it affects the whole valley. But two things must be noted: these effects diminish progressively in proportion to the distance from the river-mouth, and they cease entirely if the stream crosses an obstacle by means of a waterfall or rapids, *i.e.*, when the contour of the thalweg is discontinuous.

A *lowering of the base level* increases the speed of the erosive process and causes a greatly increased and localized erosion in the alluvial mass that is generally formed near the river-mouth.

A *raising of the base level* produces a deposition or banking up: the part of the river-bed that is below the sea becomes choked and the silting up then proceeds gradually up the valley.

Oscillations in the level of the bed of the sea therefore cause alternate erosion and deposition and the embankments thus formed will appear as *terraces* on the sides of the valley.

The diagrams in Fig. 2 show the section of a valley subjected to successive erosion and deposition. The erosion represented by the line E_1 is followed by a deposition, D_1. Then a new erosion, E_2, a little to one side,

leaves a small part of the formation D_1 still standing. Similarly the erosion E_3 leaves a strip of the deposit D_2, which will appear as a *middle terrace* between the *upper terrace* D_1 and the *lower terrace* D_3 which forms the bank of the river (R).

When the slope or height of a valley is small and the variation in the base level is relatively considerable, super-

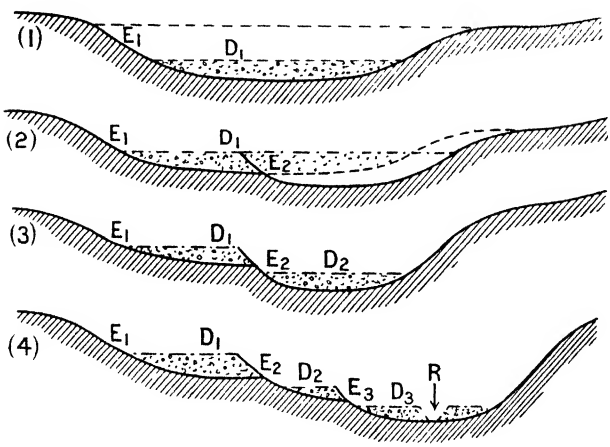

FIG. 2. SECTIONS OF A VALLEY SUBJECTED TO ALTERNATE EROSION, E_1, E_2, E_3, AND DEPOSITION, D_1, D_2, D_3 (R = river.)

position is produced. Diagram 3 in Fig. 3 shows the case where the second deposit reaches a higher level than the first. Deposit D_2 is thus superposed on D_1 and the usual stratigraphic formation reappears. An example of superposition of this kind is to be seen in the standard deposit at Chelles (see p. 100).

Difficulties and Causes of Error. The study of fluviatile formations is generally carried on in European countries in sand and gravel workings. In lands where there is less

vegetation and erosion is greater natural cuttings are provided by gullies or ravines. We will now indicate briefly some cases which may give rise to error.

(*a*) **Complex Layers: Lateral Junction of Old and New Deposits.** We have just considered a simple case of echelonning and another of superposition. But there may also be

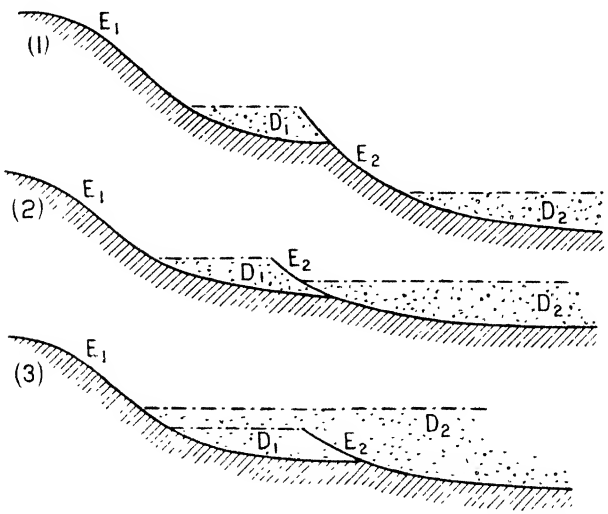

FIG. 3. DIAGRAM SHOWING THE THREE POSSIBLE RELATIVE POSITIONS OF TWO LAYERS OF DEPOSITS, D_1 AND D_2, FOLLOWING EROSIONS E_1 AND E_2

a *juxtaposition*, when the second erosion is so shallow that the deposition that follows it nearly reaches the level of the first deposit. This case is illustrated in diagram 2 of Fig. 3. It is somewhat hard to recognize in practice because of the identity of the materials and the rearrangement that will have occurred at the point of contact of the two layers of gravel. But its existence will be revealed by differences in the fauna, in the implements, and in

the surface weathering of the flints, as well as by the appearance of the two intersecting beds and by slight local signs to be looked for.

(*b*) **Illusive Stratigraphy.** Some investigators endeavour to divide the whole of a fluviatile deposit into several levels, with the preconceived idea of thereby establishing the gradual perfecting of human industry. Observations of the exact situation of objects are often difficult to make in gravel that is being worked by the crumbling of large masses from a great height. So then, replacing the missing observations by a classification made in accordance with their preconception, these investigators consider that they have established a stratigraphical division.

It is not possible, as a general rule, to build up a chronological order of deposition in a single layer of gravel, for a river often rearranges its deposits to a great depth, especially when it flows strongly and is subject to big floods. To realize this we have only to observe the undermining and embanking action of such rivers as the Rhône, the Durance, and the Loire, even in parts of their course where the slope is relatively slight. The layer of deposit will therefore contain a mixture of all objects contemporary with the whole period of its formation, from beginning to end, and we must beware of setting up thereby an *illusive stratigraphy*. This does not mean, however, that in particular cases—*e.g.*, in deposits spread very widely over a plain—it may not be possible to note examples of real stratification in a mass of gravel.

(*c*) **Rearrangement of Old Deposits by a Stream.** It is a primary principle of geology that the age of a terrane is that of its most recent fossils, for it may contain older ones as a result of the breaking up of other beds. In the cases we are considering there is obviously a great risk, *a priori*, of finding in a bank of gravel a mixture of objects

belonging to earlier periods, either through extensive rearrangement of old deposits or through the mere washing of the surface by rushing water in periods of heavy rainfall. Some prehistorians have tried to tell the relative age of objects, found in a worn condition through rolling, from the degree of attrition they have suffered. But it seems, unfortunately, that even objects of the latest period have often suffered this rolling, and that too in a very uneven manner. A fairly slight amount of rolling among gravel is enough to cause considerable changes in the points and edges of stone implements. Things left or lost by man on the bank of a river may either have stayed where they were or been dragged to a greater or less distance according to the strength of the current at that time and place, so that objects of the same period but of different degrees of attrition may be picked up in one place.

In the absence of such a criterion the industry belonging to the period of the deposit may generally be distinguished by the mere fact of its local abundance. Objects from rearranged beds are found scattered in large alluvial masses: they are no longer met with in groups like those connected with habitations along the river. It seems, too, that a very few miles of rolling among gravel was generally enough to destroy—by making unrecognizable—stones shaped by the hand of man.

A cause of error, therefore, that is so serious in theory will be found in fact to be very slight, and it may be remedied by depending on a large enough number of finds and observations.

(*d*) **Introduction of Human Industrial Elements more Recent than the Gravel.** Suppose that a stone implement is found among the materials of a fluviatile layer at a level raised above the existing thalweg and below the

loam that covers the layer. We should be disposed to conclude that man existed at the time this layer was formed. In reality, however, there would have been a human habitation of the surface of the gravel in question only at a time when the stream was depositing another layer at a lower level, and the loam which has covered the whole is of a later date than this latter formation. It is therefore essential to make sure that industrial objects are found *within* and not merely *on top of* the gravel.

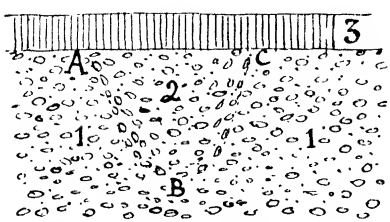

FIG. 4. REARRANGEMENT IN A COVERING OF GRAVEL

1, original deposit (ABC = line of hollowing in this deposit); 2, deposit similar to the first and filling the hollow; 3, later deposits of loam.

There has sometimes been *penetration by erosion and subsequent filling up* in the body of the deposit itself. When the layer of gravel was exposed, and man dwelt on its surface, torrential streams of water dug hollows on the sides of the valley, which were then filled up with similar materials. From the quarryman's point of view the formation then appears homogeneous, but careful examination will show that the materials are not arranged or extended in the same direction inside the filled-up hollow as in the original layer: the tools will generally be found at the junction of the two formations, *i.e.*, on the old surface of the hollow. Experienced workmen are able to recognize the existence of these 'pots.'

(*e*) **Displacements due to Frost and Thaw: Solifluxion.** Nordic geologists—and geographers before them—have long known the importance of the effects produced in summer by the surface thawing of deeply frozen soil. In a damp country the different minerals, and especially

the argillaceous lamellæ, are bound to each other by capillarity. When the soil freezes these bonds are broken by the increase in volume of the water on turning to ice, and when the thaw comes the cohesion of the soil is destroyed. If, moreover, the subsoil remains frozen, so as to form an impermeable layer, the surface soil, saturated with water from the melting snow which cannot sink in deeply, turns into a kind of gruel or porridge, which, if the ground slopes, flows downward by its own weight. It is a regular thing for tourists in Norway to have their attention called to this phenomenon on the shores of Bear Island. French geologists have given comparatively little attention to this, and it is only of late years that prehistorians have referred to it, though they have not been unaware that landslips might have occurred. The Abbé Breuil thinks that this phenomenon of *solifluxion* was of predominant importance in the Quaternary regions of Northern France and Southern England, and that the study of these regions should be "completely revised in the light of this theory." It should be noted, however, that solifluxion is much more than a glacial phenomenon: it is a northern one, for it is the endless nights of winter followed by the endless days of summer that bring about the conditions that favour it. And these conditions have never been realized in Flanders. Moreover, when a terrane becomes fluid the lack of any cohesion between its constituents very quickly produces a mixing up, which makes the original stratification unrecognizable. Now in most of the Quaternary fluviatile gravels of our regions it is very easy to recognize the layers made by streams. It will therefore be as well not to overestimate the effects of solifluxion, while giving them due weight.

(*f*) **Variations in Rate of Erosion in Different Valleys.** When it has been sought to establish the chronological

relation between fluviatile deposits echelonned at different heights in the form of *terraces* in the valleys of different streams, it has frequently been assumed that there was correspondence between levels of the same height above the existing thalweg. This should generally be the case —in regions of low relief and with a homogeneous substratum—for rivers that flow to the same sea, and in that part of their course that is near the mouth. But where these conditions do not obtain there is little likelihood of such a correspondence.

B. **Searches in Loam.** The effects of æolian denudation are well known—the conveyance by the wind of fine materials in places where the soil is not protected by vegetation. The commonest example in our part of the world is the sand-dunes beside the sea, but the magnitude of the phenomenon in great continental deserts like the Sahara is familiar to all. The displaced particles are often almost entirely siliceous, *i.e.*, sand, but in some cases, such as in Central Asia, they are a mixture of sand, clay, and limestone forming a generally yellowish earth called *loess*. Formations resembling the Chinese loess exist throughout the whole of Europe as far west as England and France. What are the exact conditions in which they were produced? This question of the origin of loess has often been discussed, and some have argued for an æolian origin while others have regarded this loam as a formation produced by running water. Actually it would seem that wind and water have both had a hand in it. An example of the formation of loess has been cited in the Rhine valley: the river overflows, deposits its loam on the plain, and returns to its bed; the loam dries, is caught by the wind, and accumulates on the sheltered slopes opposite. In the Gobi desert can be seen the capital importance of the action of the wind in a dry land where

the disintegration of the rocks is favoured by great and rapid changes in temperature. But in some cases water plays an important part: it collects between the sand-hills in little lakes or marshes called *nors*, and at the bottom of these cup-shaped hollows are formed clayey deposits. From time to time the wind carries away the sand-hills and fills up some of the *nors*, while others are formed in new hollows, thus giving rise to deposits made alternately by wind and fresh water. In this way we get an inkling of how complex is the history of the formation of loess. But a few general characteristics appear: first there is needed a climate severe enough for vegetation to leave the soil at least partially exposed, and then there is the important part played by the wind in throwing these formations 'like a mantle' over the land in the form of waves. The result is that the position of the deposit in relation to the bottom of a valley gives no indication of its age: the same loess will be found covering gravels at different heights and of different ages. (Strictly speaking, the simile of the mantle is not quite accurate, for the material deposited by the wind is not of uniform thickness: the slopes exposed to the wind are denuded, and deposits accumulate on the sheltered reverse slopes, as in the case of snow.)

When the loess is subjected long enough to a moist temperate climate like that of France to-day, its surface changes, becoming richer in clay by the dissolution of the limestone, reddened by the oxidation of the ferrous salts, and still darker in colour by the addition of organic debris. This weathered layer is sometimes carried away by running water and forms new deposits of weathered loam called *lehm*. Moreover, the surface washing that removes the finer parts of the soil leaves in place the fragments of stone that were scattered throughout the mass, and a bed of pebbles is thus formed.

If we cut a section through the thick deposits of Quaternary loam in the north of France we see changes in colour and in the nature of the material on the same vertical line. At some levels are darker loams resembling those of the present-day soil, while sometimes thin layers of pebbles appear in section like lines dividing the beds of loam. These point to the existence of ancient soils

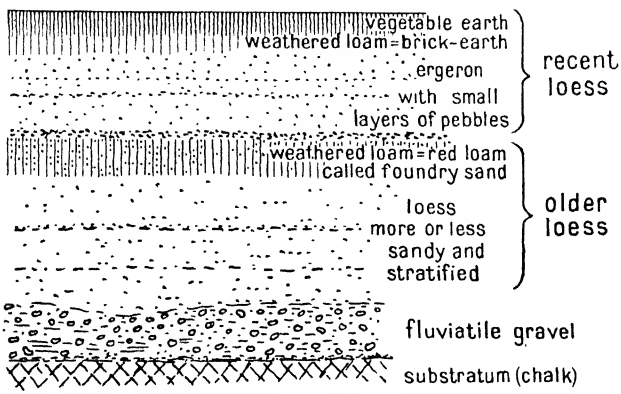

FIG. 5. DIAGRAMMATIC SECTION OF QUATERNARY FORMATION IN NORTHERN FRANCE, SHOWING TWO LAYERS OF LOESS SUPERPOSED ON FLUVIATILE GRAVEL

produced by stoppages in the accumulation of loess and the washing of its surface.

Thus in Northern France there are two principal loess formations (Fig. 5). The more recent loess—generally pale yellow—called *ergeron*, has been weathered in its upper part, which forms a reddish layer that is worked as brick-earth. The top of this layer constitutes the vegetation-producing soil, often covered with flint debris. Lower down the same phenomenon is repeated: the older loess appears covered by a red loam on which lies a bed of pebbles. The formation of the pebble bed and the

reddening of the top of the old loess are indications of conditions resembling those of the present day: it is an old soil that was formed while the loess was no longer being deposited, and it constitutes a well-marked level.

Difficulties and Causes of Error. Although deposits of loess extending over vast areas have a certain homogeneity arising from the main features common to the history of their formation, yet purely local happenings have sometimes left their mark on the formation and have even succeeded in obliterating the principal features. The physical nature of the loess, though remarkably uniform as a general rule, sometimes varies considerably in different places. Care must be taken, therefore, not to identify a layer from its appearance alone in cases where the complete stratigraphical succession is not visible.

C. **Searches on the Exact Sites of Dwellings.** Finds in fluviatile alluvium and in loess appear to be connected with somewhat extensive and ill-defined areas of human occupation. But there are also cases where it is possible to discover a definite site of prolonged habitation. The best known of these are *caves*, but *pit-dwellings*, *rubbish-mounds*, and *lake-dwellings* are other kinds of habitations that are very widely distributed and have yielded many documents.

(*a*) **Caves.** Caves in the strict sense, or shelters formed merely by an overhanging rock, are natural refuges frequently made use of by men as well as animals. It is generally in them, too, that archæological remains have been best preserved, and so they are the happy hunting-ground of the investigator. The stock phrase 'human archives' is more appropriate to caves than to any other places, and the duty of respecting these archives—submitting them only to expert exploration with the scientific precautions needed to draw from them such information

as they can yield—should be regarded as a particularly imperative one.

Many deposits have already been ransacked, and to know what should *not* be done it is useful to note the chief faults that have been far too often repeated. Investigators have often proceeded to dig holes here and there, just as fancy led them, putting the earth back from one hole into another, so that eventually it is impossible to tell which parts have remained untouched. They have also generally neglected to pick up all the objects, and by replacing the excavated soil they have sometimes made a series of layers forming a kind of artificial stratification. Former excavators—and not the small fry, either!—frequently posted workmen on the site while they themselves merely kept an eye on the job from time to time. It is easy to estimate the value of stratigraphical observations made in this fashion.

Again, it very often happens that insufficiently trained investigators collect only what interests them—usually the best 'collector's pieces'—while the bones are thrown back. Most of the tombs excavated in earlier days have been spoiled in this manner. Manouvrier protested long ago against the behaviour of these prehistoric curio-hunters: "You find it natural enough," he said in effect, "to throw away the bones, because it is only worked flints that interest you, but what would you think of an anthropologist, a specialist in the study of tibias, who dug up prehistoric tombs to collect these bones and threw away the flints and pottery and so forth because he was not interested in them?"

In actual practice a search should begin with a boring to see whether the cave was inhabited or used as a burial place. If it is decided to excavate it is best to make a clean section of the bed. In the usual case of a cave opening

into the side of a hill a trench will be dug in the same direction as the slope of the ground and at right angles to the entrance of the cave. This trench will be dug down as far as the original soil, which is generally rock, for under a bed of rubbish there may always be found a habitational layer. After carefully surveying the section thus obtained—*i.e.*, noting the succession of habitational levels and sterile ones (Fig. 6)—the task of exploring the different layers will be undertaken.

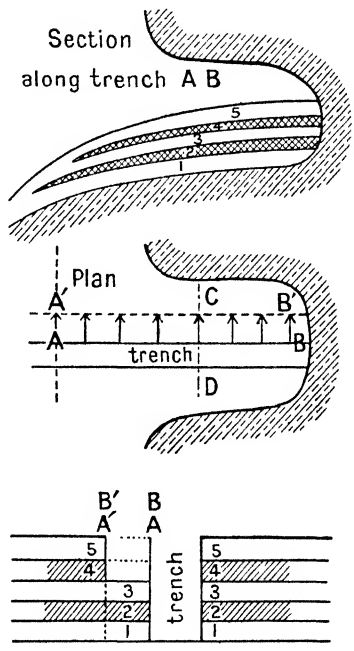

FIG. 6
SECTIONS AND DIAGRAMMATIC PLAN SHOWING THE METHOD OF EXCAVATING A CAVE

If the section is excavated through its whole depth there is a risk of getting a mixture of objects from different levels. If we try to remove the layers one by one we may find it difficult to follow a layer laterally because of its variations in thickness, colour, and character at different points. There is a danger of leaving part of it or of removing along with it part of another layer. And it is very interesting to be able to examine and photograph a series of sections. Starting then from the first section AB we first remove the top layer over a moderately large area, the extent of which must be determined by circumstances.

The second layer is then removed over the same area, and so on until we have made a new section A'B'. All the excavated earth should be sifted to make sure that everything is collected, and what is left should be deposited in a proper dump far enough from the field of operations not to hinder the rest of the work.

Difficulties and Causes of Error. Theoretical difficulties do not appear to be great, but the practical difficulty arises from the fact that the actual digging—the extraction of pieces of the bed of earth—must be done with great care, and therefore slowly and by the prehistorian himself. He may have help, but the less the better in this business, for he will find that observations have to be made that are sometimes fleeting, impossible to foresee, and such as anyone else would miss. In any case the excavator should be constantly on the spot, and he therefore needs both time and money.

One cause of error arises from the fact that the successive deposits are not usually horizontal. They take more or less the irregular shape of the original surface or of local masses of earth. If for any reason it proves impossible to follow a layer continuously there is a risk of going wrong by mistaking for the continuation of this layer an outlying formation that occupies the same horizontal line.

Recent rearrangements may be the result of bad excavation, while others have been caused by the extraction of saltpetre (especially at the time of the Revolutionary and Napoleonic wars in France). But the commonest case, and the one most likely to cause mistakes through lack of very visible signs, is that of the *burrows made by animals*. First they throw upward the objects at the bottom, and then after their departure the slight caving in of the burrows may cause pieces of the upper layers to reach the lower levels. When the earth eventually

settles down again there is hardly a trace of these slight irregularities, but in the course of thousands of years this must have happened may times, so care should be taken not to draw too many conclusions from an unusual and isolated discovery.

In the case of *tombs* man sometimes buried bodies by his own fireside, not very deep. But often he dug deeper, and the tomb, with bones and personal belongings, is found in an older layer. Careful observation will generally reveal the shape of the grave and the level to which it belongs, the conclusion being confirmed by the nature of its contents.

The entry of *water* has sometimes in places hollowed out and rearranged the deposits in a cave on the side of a valley: the floods that follow great storms may raise the level of the water in a deep and narrow valley by fifty or sixty feet or even more.

Rock-shelters are very similar to caves, but they have one special cause of error in addition. Fig. 7 shows a diagram of such a dwelling. Man settles first on the upper platform of the shelter and thus causes the formation of a layer—level 1. Later on he occupies the base of the shelter—level 2. Then the falling in of part of the overhanging rock that forms the roof causes the materials of level 1 to be washed down and superposed on level 2. (A phenomenon of this kind has been observed in one part of the famous beds of la Quina, in Charente.)

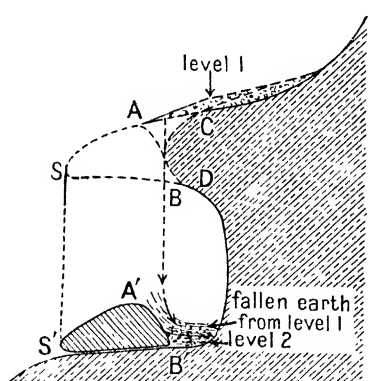

FIG. 7. DIAGRAM SHOWING A CAUSE OF STRATIGRAPHIC INVERSION IN A ROCK-SHELTER

Similar results may be produced in the riverside deposits of a stream when the banks are (or were) steep enough to cause slipping to take place.

(*b*) **Pit-dwellings.** In some countries, especially in the great plains where the soil is deep, men have made dwellings more or less underground. A common example is one that goes down twenty or thirty inches into the earth. These pit-dwellings are discovered by noting various signs, as follows. Deep ploughing brings to light debris of pottery, flint, etc.; small burrowing animals, such as moles, also bring to the surface specimens of the underlying formation, and in this way we find a blackish earth, laden with organic matter and carbon, brought in small heaps on to the lighter-coloured soil. Again, the mass of loosened earth that filled the dug-out site sometimes behaves differently from the neighbouring areas. Thus in winter a white morning frost or snow will disappear more quickly on such a spot, and in spring or summer, when the vegetation changes, there will be a difference of colour in the grass or the crops. All this is particularly visible from a distance and from above, and *air observations*, pioneered chiefly by Mr O. G. S. Crawford in England and Father Poidebard in French Syria, enable us to recognize on the ground traces of work otherwise entirely invisible. The surface of the earth is like a palimpsest on which each generation has written something while Time and Man have erased the writing.

The use of an iron sounding-rod, driven into the earth by hand, yields information of two kinds: it brings up particles of earth from the depths, and by the more or less hollow sound it makes when driven into the ground it reveals to the practised ear the presence of sites dug long ago.

(*c*) **Shell-mounds.** At very different periods and places,

but especially on the seashore, men have occupied restricted areas for long periods where their kitchen refuse, discarded tools, etc., accumulated till they formed heaps many feet in height. Deposits of this kind were first studied in Denmark, where they were given the Danish name *Kjökkenmödding* (English, *Kitchen midden*), meaning kitchen refuse. They were situated near the sea and consisted chiefly of the shells of edible bivalves, whence the English have given the name *shell-heaps* or *shell-mounds* to similar deposits. In Brazil they are called *sambaquis*, in Japan *kaizuka*, and in North Africa the name *escargotières* is given to similar formations in which the shells of snails (*escargots*) predominate. Generally speaking it is very difficult to make any stratification out of a shell-mound. It would certainly be a mistake to proceed by removing horizontal layers. If it is possible to distinguish successive depositary zones they will have the curved shape that results from the normal growth of a heap.

(*d*) **Lake-dwellings.** Villages built on piles beside the water are often given the French name of *palafittes*, from the Italian *palafitta* (*palo* = a pile or stake, and *fitto* = planted). They are most numerous in the Alps and the Jura.

The great interest attaching to researches in lake-dwellings arises from the exceptional state of preservation of the objects met with. Whether preserved in peat or in fine mud, the substances that elsewhere have disappeared have here been protected against decomposition. Wood, grains, the stones, pips, and even the pulp of fruits have been preserved, and wickerwork, woven fabrics, and the handles of weapons and tools have frequently been found.

The possibility has also been recognized of finding ancient, identifiable pollen-grains preserved in the peat or mud. Such is the generosity with which nature scatters

the seeds of life that by the study of pollen-dust there is a good chance of learning most of the vegetable species of the period, many of which would evade other kinds of research. The *pollinic spectrum* of a level is the term used to denote the sum total of the vegetable species identified by the pollen found at that level, classified by percentages. Such a method provides the best indication of climate that it is possible to have.

It was formerly the custom to dredge or fish for lacustrine antiquities when it was impossible to drain the site. But to make a stratigraphical study recourse must be had to other methods borrowed from modern engineering practice, such as the use of caissons and pumps or diving-bells, etc. There is often a chance of the drainage being brought about by the commercial exploitation of the peat.

Careful observation will sometimes enable us, even when the wooden handles have been destroyed, to see how flint or bone objects were fitted in order to make composite weapons or tools. Their relative positions will show the relation between them. Thus flakes of flint put end to end to make the cutting edge of a knife or reaping-hook, or barbed bone points arranged so as to form a harpoon, may be recognized for what they are even without their fittings.

General Cause of Error: Fraud. In dealing with each kind of research we have briefly indicated the *special* difficulties and causes of error to be met with owing to the nature of the objects. But since we live in a community there arises a *general* cause of error—the frauds perpetrated by man. There is much to be said on this subject, but we will mention only the principal facts, some of which are often unrecognized.

Fraud, like the spirit of deceit, is a thing of all ages and of all places, and archæology has had its frauds ever

since it was born. As soon as researches are begun in any country, no matter how remote, and men get interested in them, the idea of fraud enters their minds if there is any profit whatever to be made out of it. The commonest motive of the swindler is the desire for gain: the quarryman or humble shepherd who is commissioned to collect chipped flints for payment tries to make them himself. Added to this motive is malicious curiosity to test the knowledge of the investigator. And among educated people the desire to play a practical joke, with or without the intention to do harm, and the desire to obtain notoriety by sensational discoveries are common inducements to fraud.

It cannot be taken for granted that *anyone* is above suspicion in regard to archæological fraud, for honesty in this matter is different from ordinary honesty. We have seen fathers deceived by their sons: Charles Lenormant, one of the most prominent members of the Académie des Inscriptions, was cheated by his son François, himself later a member of that famous society. We have seen scientists hoaxing their best friends, as when the chemist Meillet, of Poitiers, tampered with the excavations that he was undertaking in collaboration with his friend Brouillet. So it must be concluded that the only men who can be considered 'safe' are those with a career of archæological honesty behind them.

An uneducated swindler may succeed in hoaxing a very learned man by bringing forth his forgeries gradually and allowing himself to be directed by his victim, who thus acts unwittingly as his guide. The victim expresses his wishes, keeps the swindler informed of the criticisms directed against him, and supplies him with all the information needed to carry on and improve the deception. The fraud will, broadly speaking, be the work of

the victim's own brain, and this explains the blindness with which the unconscious instigator lends himself to it.

Another point to be noted is the persuasive power of a fraud committed on the ground itself. But it is easier to fake the field of operations than the objects found: the signs of faking disappear at once during the process of uncovering the site, whereas the objects remain available for further study.

We reach the practical conclusion that if forgeries are to be detected a good knowledge is needed of the workmanship and physical characteristics of the materials employed, particularly the surface changes, called *patina*. Workmen should never be promised rewards for making a discovery described to them beforehand: that is an inducement to fraud that has often been the cause of serious errors. Again, while getting our employees interested in the finds, we must avoid taking them into our confidence and giving them too many explanations which might set their imaginations to work and show them the extent of the check that can be put on their assertions. In conclusion, a mere argument from authority should never be accepted as proof of genuineness: the greatest scholars, who are sometimes deficient in technical knowledge, have been known to fall into the grossest errors from a combination of circumstances.

CHAPTER IV

TECHNOLOGY

It is indispensable for the prehistorian to know the methods used by primitive man in making the things that constitute our principal archæological documents —*i.e.*, objects of stone, bone, and pottery, the rest having for the most part perished. These technical methods can be studied from existing examples furnished by ethnography, from tool-marks discernible on ancient objects, and by direct experiment. This last mode of study, although at first sight it may seem the most attractive, is far from being the most important. To realize this we need only look at our own modern industries, where we shall see that the simplest methods are the ones that require most 'knack'—the skill acquired by the direct teaching of old tradition and long personal practice. Now, the experimenter cannot lay claim to either of these advantages. And even if he finds a way of using, or even making, a stone object, that is not enough to prove that this was actually the way the thing was used or made. Too much attention, then, should not be paid to direct experiment, though it is to some extent indispensable for acquainting us with the physical properties of the materials used from the point of view of primitive man.

The Study of Stone Implements

(*A*) **Materials Used.** Stone seems to have been chosen and treated for use as tools according to its possession of two essential qualities—*hardness* and *toughness*. The hardness of a rock is judged by the possibility or otherwise

of scratching it with certain kinds of minerals used as standards for this purpose. A scale of hardness is used in mineralogy, comprising ten degrees or terms of comparison, but in practice it will be enough for our purpose to divide rocks into three categories of hardness (Werner's simple scale)—viz., *soft* rocks, which can be scratched by the finger-nail, the chief being gypsum and steatite; *semi-hard* rocks, which can be scratched by a pen-knife but not by the nail, such as limestone and serpentine; and *hard* rocks that cannot be scratched by steel, such as flint, diorite, and jadeite.

The quality of *toughness*, which is of the first importance for the working of the stone, is not considered in mineralogy and petrography like that of hardness. We shall distinguish two kinds: *brittle* rocks, like flint, from which large flakes can easily be detached by a blow, and *tough* rocks, like diorite and jadeite, from which a blow produces only small fragments or merely local crushing.

The identification of the stone used by prehistoric man is of twofold interest. It serves in the first place to indicate the mode of workmanship and employment according to the physical properties of the material, and it also in some cases reveals the foreign origin of a rock and thereby establishes the fact of importation, pointing to commercial relations or immigration. But we must beware of hasty deductions, and not infer the foreign origin of a rock without being certain that there is no local formation that is now forgotten because it has lost its utility.

Rocks are aggregations of crystals, generally of varied kinds. They differ in the kinds of minerals they contain, in the proportions of these minerals, and also in their crystalline structure. The result is that there is an immense variety of rocks, and that the choice of classificatory divisions is difficult and necessarily arbitrary.

We should beware of seeking for an illusory precision and using a number of more or less synonymous terms, and keep only the wide general terms that concern those qualities in which alone prehistoric man was interested. In exceptional cases, however, we should note where possible the special features which enable us to specify the place of origin of a variety of rock.

Using the categories defined above we may classify as follows the kinds of stone most commonly used in primitive industry:

(*a*) **Soft**: *steatite*, a hydrated silicate of magnesium; grey, blackish, steel blue, or reddish in colour; very compact; examples of its use: club-heads in Central Africa and sling-stones in New Caledonia.

(*b*) **Semi-hard**: *limestone*, carbonate of lime mixed with impurities, such as clay and sand, and sometimes hardened by siliceous impregnation; examples: club-heads in Egypt, axes in Central America, pebbles shaped by splintering in certain Neolithic deposits in Portugal; and *serpentine*, hydrated silicate of magnesium and iron; colour usually a more or less dark green; a tough stone, worked by polishing; frequently used all over the world for axes.

(*c*) **Hard and Brittle** (fracturing in flakes): *flint* or *silex*, found in concretions, either nodular (kidney stones) or in layers or slabs usually embedded in limestone; a mixture of different varieties of silica (quartz, chalcedony, quartzine, opal). The surface of flint changes through the disintegration of some of its elements, especially the opal. The name *patina* is given to this weathered layer, which is generally whitish in colour. Former prehistorians also called it, very improperly, *cacholong*, from the name of a white variety of chalcedony. The impure surface layer of flint kidney stones is called *gangue* or *cortex*. Flint was the finest possible stone for making implements and

weapons, and it breaks normally into flakes. At the end of the Stone Age it was occasionally polished in some areas.

Other varieties of silex, differing in their impurities or in having a schistoid texture, are the *calcareous gravels*, the *silexites* or *cherts*, and the *phtanites* or *Kieselschiefer*.

The *quartzites*, or cemented siliceous sandstone (called *lustrous sandstones* when they have a bright fracture), break into flakes almost as well as flints, but are of rather coarser grain. They are the ordinary substitutes for flint when that stone is absent. Very fine coloured quartzites or coloured silicified schists are called *jasper*.

Obsidian is a lava corresponding to syenite. It generally has the appearance of black glass and is a valuable material that splinters admirably. Whenever man has been able to find obsidian he has made use of it and often exported it. Examples of its use are the blades of the island of Milo (Melos), Mount Ararat, and Mexico.

(*d*) **Hard and Tough** (rough or uneven fracture). The most abundant of these, made use of all over the world, are the igneous rocks, finely crystalline and rich in ferro-magnesian silicates (amphiboles or pyroxenes) which give them a green or blackish colour.

The *diorites* (a mixture of feldspar and amphibole) or rather the *microdiorites* (finely crystalline diorites) were frequently used for polished axes. The corresponding lavas, or *grey andesites*, also sometimes provided millstones, grinding implements, etc.

The *gabbros* (feldspars and pyroxenes) and especially the *microgabbros*, of which the uniformly fine-grained varieties are called *dolerites*, provided many axes and clubs. Rocks of this group have often been called *diabases*. The best known of the corresponding lavas, or *black andesites*, is *basalt*, of the olivine variety.

The *amphibolites* and the *pyroxenites* are zonate rocks

composed of feldspar and especially amphibole or pyroxene.

Jade is a rock containing amphibole, of hardness 5·5, about that of a knife-blade, and of somewhat fibrous structure.

Jadeite, a rock containing soda pyroxenes, has an appreciably greater hardness than jade (6·5 or 7 against 5·5) and, unlike the latter, is fairly easily fusible. *Chloromelanite* is an almost black variety of jadeite. These semi-precious stones were used to make weapons for display purposes and sometimes implements (New Zealand).

Fibrolite, an often fibrous aggregation of crystals of sillimanite (aluminium silicate), of different colours, frequently mottled, white, black, red, yellow, green, etc., provided many small axes (in Brittany, Velay, etc.).

(*B*) **Methods of Working Stone.** There are two main methods of working stone, viz., flaking and polishing (percussion and abrasion).

Flaking is the normal method for brittle stones of the flint type. Starting with a small block of the material the workman sometimes tried to shape it by removing splinters or chips, but more often his object was to divide it up into usable flakes. The term *core* or *nucleus* (Fig. 8) is applied to the block ready for working, or while being worked. Sometimes the flaking was somewhat haphazard and the core was irregular, flaked in all directions, and globular, but often it was carefully fashioned with the object of removing flakes of a precise shape. This was accomplished in various ways. The core was often held in the hand, perhaps resting on the thigh or on the ground, while the workman struck it with a tool that served as a hammer. This tool, usually a rounded stone called a *hammer-stone*, is easily recognized because it is battered from the blows it has given (see Fig. 9, No. 3).

Another method consisted in striking the core against a block of stone placed on the ground to serve as an *anvil.* As the core could then be held in both hands and assistance could be given by the movement of the body, this method gave more power, but precision was harder to attain.

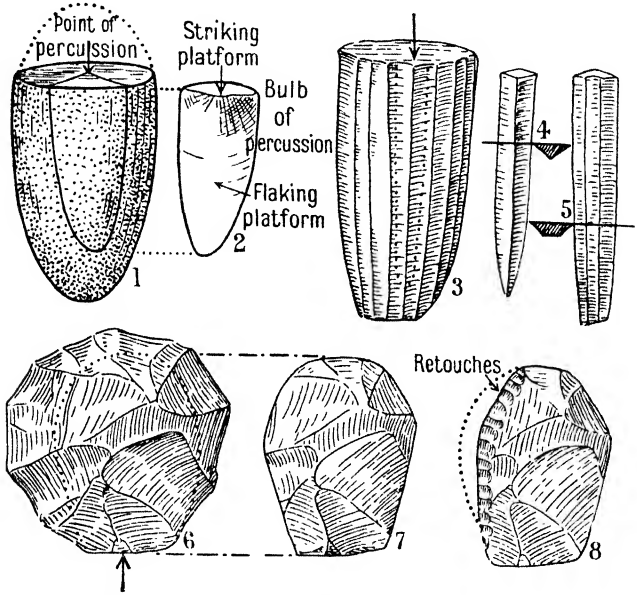

FIG. 8. FLAKING AND RETOUCHING OF FLINT

1, 2, core and flake; 3, 4, 5, prismatic core and blades; 6, 7, discoid core and oval flake; 8, flake retouched on one edge.

Finally, we learn from the earliest explorers in Mexico that the natives there used to cut obsidian by pressure with a piece of wood worked with all the strength of the body while the core was held between the feet.

The flat surface on which the blow is delivered to detach the flake is called the *striking platform.* The surface along which the fracture is produced is called the *flaking*

platform, but it is not actually a plane surface, for near the *point of percussion* it shows a swelling called a *conchoia* or *bulb of percussion*. The detached splinters that are elongated like the blade of a table-knife are called *blades*, and those that are wide and generally triangular or oval are called *flakes*.

After their removal from the core the rough blades or flakes are often subjected to a further process to trim them or alter their shape, especially their edges, so as to make them into special implements. This is done by removing small chips, and the marks of these left visible on the flake are called *retouches*. They are made either by striking with a stone or bone (perhaps a piece of wood, according to M. Coutier's experiments), by pressure with a kind of bone or horn punch called a *flaker* (*cf.* the "arrow-flaker" of the Eskimos), or, lastly, by crushing the edge of the flake in the jaws of an instrument resembling the glazier's *crumbling-iron*. The Tasmanians, apparently, have been seen to use their teeth for this purpose.

Polishing. This mode of working, which is more or less bound to be employed in the case of tough varieties of stone, normally involves two phases, the first of which is often overlooked because it leaves few traces. This is the *roughing-out* process, which consists in shaping the stone by pecking at it or 'bush-hammering' it with blows of the hammer-stone at right angles to the surface, so that each blow crushes a small part of the substance. When the general shape of the object has been thus obtained the workman proceeds to the *polishing*, which is the only way to get a real cutting-edge. When the polishing extends over the whole of the object it shows up the beauty of the stone, but it was often limited to sharpening the edge.

Polishing is done either on a fixed grindstone or by a kind of pestle. In the first case the piece to be polished

is rubbed to and fro on a block standing on the ground. If this block consists of an abrasive stone, such as sandstone, that is all that is needed, but more often it consists of some kind of hard stone, used merely as a stand on which sand is placed as an abrasive. On these fixed grindstones, called *rubbers*, the polishing process produces elongated, cup-shaped depressions (Fig. 9, No. 5). Implements made by this method generally have their lines

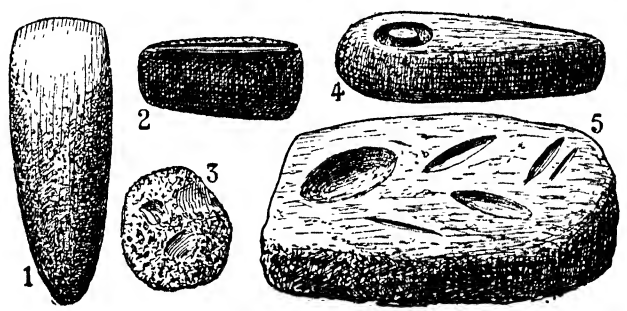

FIG. 9. POLISHING AND SAWING

1, axe made by pecking and sharpening (so-called 'polishing'); 2, axe showing marks of sawing; 3, hammer-stone; 4, axe with eye in course of perforation; 5, fixed grindstone for sharpening, called a 'rubber.'

of curvature smooth. With the pestle, however—a small block worked by hand on the implement, which is kept stationary—the process tends to produce facets and sharp changes of curvature.

We have used the term *polishing* because it is consecrated by tradition, but it is really improper, for the process actually resembles one of filing and sharpening. Sometimes, however, it was followed by an actual polishing to give a gloss to the surface. Various processes may have been used for this purpose. It is said, for instance, that the New Caledonians finished off their ceremonial axes by placing them for a time under a waterfall, where the

very gentle friction of the sand brought down by the water gave them a beautiful polish.

Sawing. Precious stones like jadeite, and those that are not easily worked by hammering, such as fibrolite, were fairly frequently cut by sawing. This was done by digging a groove with sand applied by a wooden blade or a string (*cf.* the modern method of sawing marble and diamond). The Indians of Mexico at the time of the Spanish conquest were so expert at this work that when taken captive they rapidly sawed through their irons.

Boring. There are two principal ways of boring a hole in hard stone—viz., *percussion* and *rotatory abrasion.* By striking with a small enough hammer-stone a cup-shaped depression is produced at the desired spot, as deep as half the thickness of the stone, and the process is then repeated at the corresponding point on the opposite side, so that eventually a hole is made of a double conical or 'hour-glass' shape.

To bore a hole by rotatory abrasion a wooden drill is used, with either a hard stone point (for small objects) or a wooden one supplied with sand as an abrasive. In the latter process, used for making a fairly large hole, such as the eye of an axe, the end of the borer is generally a tube—a piece of bamboo is used in Oceania—which leaves a core that becomes detached in the centre of the hole, like modern drilling instruments. (Fig. 9, No. 4.)

(*C*) **Principal Types of Stone Implements and Weapons.** Some types that are particularly sensible and well established by experience are common to many periods and many lands, and have received names that are now in common use. We shall describe them briefly, arranging them for convenience of description in two main classes according to their method of manufacture.

(*a*) **Pieces made by Flaking.** With the descriptive

purpose always in view we can distinguish two chief categories—viz., *double-sided* objects (*bifaces*), worked on both sides, and *single-sided* ones (*unifaces*), where only the

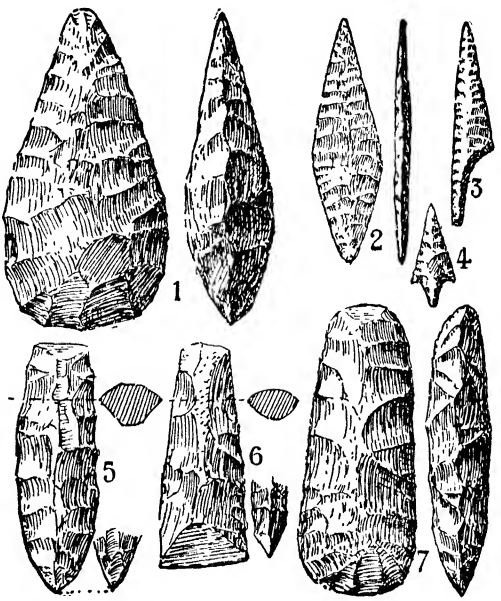

FIG. 10. DOUBLE-SIDED OR TOTALLY CHIPPED PIECES

1, double-sided Chelleo-Acheulian type; 2, leaf, Solutrean type; 3, notched point, Solutrean type; 4, barbed and tanged arrow-head, Neolithic type; 5, pick; 6, *tranchet*; 7, axe.

upper side of the flake is shaped by retouching, the other remaining smooth.[1]

Double-sided pieces (Fig. 10). The term *double-sided* denotes in practice an object of the types prevailing in

[1] *Translator's Note.* This distinction between *biface* and *uniface* corresponds fairly closely to that between the 'core' implements and the 'flake and blade' implements of English archæologists. But to preserve the Author's classification and definitions it seems best to translate *biface* by 'double-sided' and *uniface* by 'single-sided.' The term 'biface' is, however, sometimes used in English.

the Chelleo-Acheulian period. The best known of these types is almond-shaped. In this implement the broad part is the thickest and forms a butt or body for grasping or for fitting a haft, and the operative part is the region of the point. Implements of this type were at first called 'axes,' and later *coups-de-poing* or 'hand-axes.'

The term *leaf* is applied to thin pieces, worked on both sides, of which the best-known types are shaped like laurel-leaves or willow-leaves. In some cases there are notches that produce a stalk or tang for hafting, and sometimes barbs: these indicate the use of the leaves as arrow-heads or the heads of spears or javelins. The others often resemble knives or daggers.

The *axes* have shapes that recall the part of a modern axe in front of the eye or socket. Unlike the double-sides which they may sometimes resemble in outline, the broadest part is the cutting part and the two sides are convex in the neighbourhood of the cutting-edge.

The *tranchet* consists of a basil without retouches at the end of a somewhat elongated body. The basil, or cutting-edge fresh from the flaking, results from the first splitting of the flint, the body being chipped afterwards.

The *pick* is a roughly cylindrical implement, often prismatic with a triangular section, and with a pointed end of no very precise shape.

Single-sided pieces (Fig. 11). We have defined *blades* and *flakes* in connexion with the cutting up of flint cores. They were sometimes used 'fresh from the flaking'—*i.e.*, just as they were when detached from the core—but sometimes they were subjected in places to secondary work on one face so as to improve their cutting qualities without making a new shape, and such blades or flakes are said to be *retouched.* Early prehistorians often gave the name *knives* to 'fresh' blades of regular shape, such as the types

with triangular or trapezoidal sections produced by successive removals from a prismatic core.

Sometimes the flint blades were again cut on one side by steep retouches almost perpendicular to the blade, the other side retaining its 'fresh' cutting-edge. These pieces, often shaped like the blade of a penknife, or rectangular, are called *battered-back* blades.

It has become customary to give the name *side-scrapers* to flakes having the long side made into a slightly convex cutting-edge by single-sided retouches. But ethnography shows that implements of this kind are used by Eskimo women as knives for household purposes, and the name *ulu* which is given to them is worth retaining, for it has no equivalent in civilized languages, whereas the implement itself has many equivalents in prehistoric industry.

The name *hand point* or *Mousterian point* is given to a flake with both edges retouched to form slightly convex cutting-edges, making an ogival point.

The essential feature of the *scraper* is a rounded cutting-edge on a flake or blade whose lower face is smooth and almost always somewhat concave. There are two principal types: the *discoid* scraper, the whole circumference of which can be used for scraping, and the end-scraper *at the end of a blade*, in which only the slightly curved extremity of the blade is used. There are also *concave* scrapers, resembling notches made in the edge of a flake. Some very thick scrapers, having the upper part shaped like a keel, are called *keeled* scrapers, and similar implements of much larger size are called *planes*. Flint cores, after the removal of a certain number of blades, were often retouched round the whole circumference of their base and thus used as planes. With them we leave the implements that can properly be called *single-sided*.

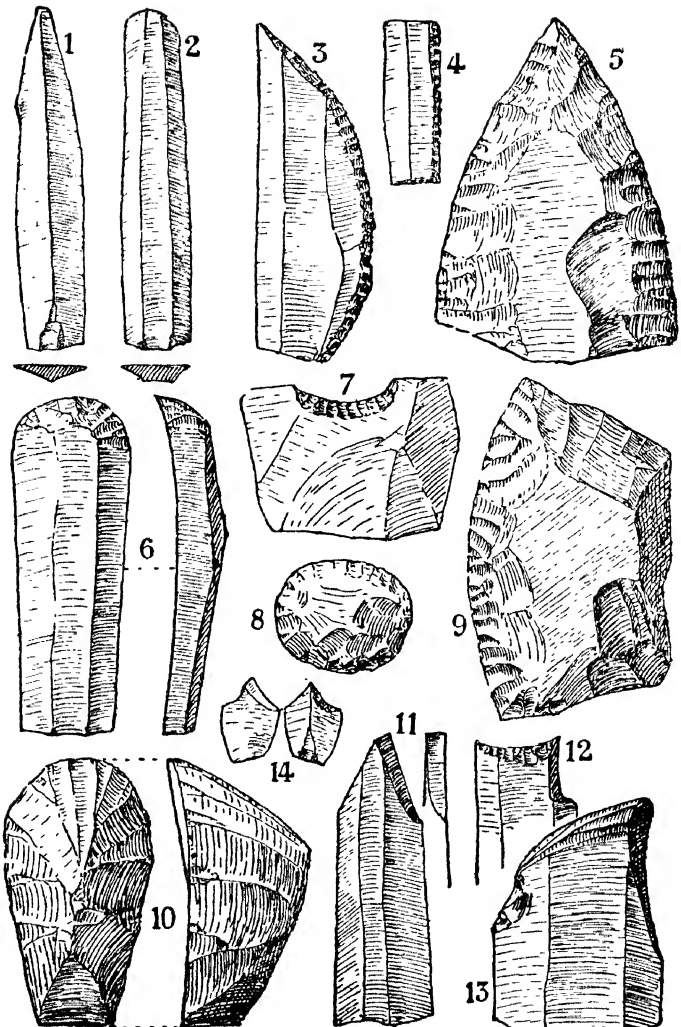

FIG. 11. SINGLE-SIDED PIECES

1, 2, blades of triangular or trapezoidal section; 3, 4, battered-back blades; 5, Mousterian point; 6, end-scraper on end of blade; 7, concave or hollow scraper; 8, discoid scraper; 9, side-scraper; 10, keeled scraper; 11, *bec-de-flûte* graver; 12, angle-graver; 13, busked graver 14, micro-graver.

The *graver* can be defined, on the analogy of the tool used by metal engravers, as an implement consisting essentially of a narrow cutting-edge capable of cutting a groove in a resistant substance. Generally, therefore, it will be a little cutting-edge made in the thickness of a blade. But prehistorians regard objects particularly from the point of view of the characteristics that distinguish them from each other, and especially their mode of manufacture, and so they confine the term *graver* to those made in a certain manner—viz., by striking a blade in a longitudinal direction to detach smaller blades, whose flaking plane is perpendicular to that of the original blade. Many varieties of graver can be distinguished, such as the *bec-de-flûte* graver, the *busked* graver, the *angle-graver*, and so forth.

The type of implement obtained by making a notch on half the breadth of a blade and then breaking it obliquely at this point was first called a *transverse* graver and then, in the case of all small pieces or microliths, it was called a *micro-graver*. This implement resembles some kinds of drill or auger rather than a graver. At the same time it has the character of a little cutting-edge made in the thickness of a blade, but obliquely. It should be added that gravers and micro-gravers may be regarded as single-sided pieces because the blade-foundation in both cases is single-sided.

Leaf-shaped objects and arrow-heads are also to be met with, either with or without notches, etc., made by retouching on one side, though we have mentioned these as ordinarily double-sided.

(*b*) **Objects made by Chipping and Grinding, or Polishing.** This mode of manufacture suffers from the drawback of being a slow one. It was rarely employed except in the case of the tough stones that made it essential, and

these were seldom used except for implements in which toughness was a necessary quality, viz., those used for striking, such as axes and maces (Fig. 12). Nevertheless

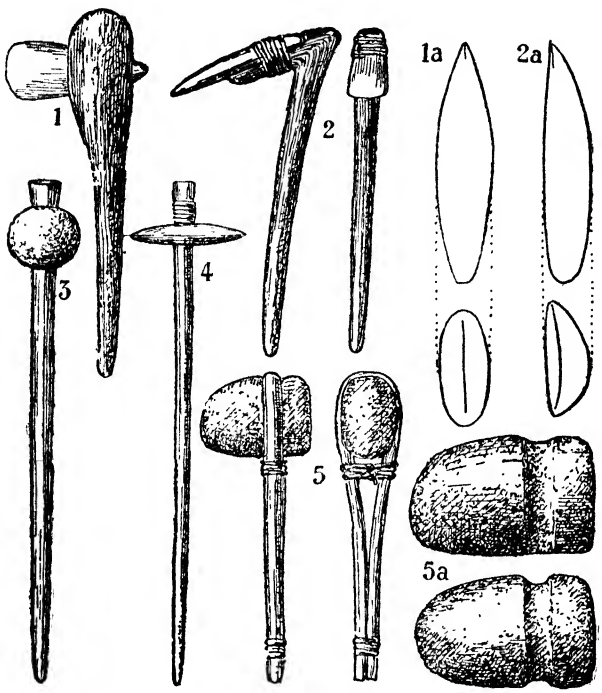

FIG. 12. POLISHED AXES AND MACES

1, axe; 2, adze; 1a, side views of stone axe and its cutting-edge; 2a, ditto, adze; 3, 4, maces (globular and discoid); 5, grooved mallet; 5a, ditto without haft.

in some regions flint was sometimes polished, especially for axes.

Polished axes. This name covers both *axe-heads* and *adze-heads.* In an axe the cutting-edge and the haft are in the same plane—the implement's plane of symmetry—

whereas the cutting-edge of the adze is at right angles to this plane. The general result of this difference is that the axe-head is symmetrical, both faces being equally convex, while the adze-head has one face only slightly convex, flat, or even concave, and the other very convex.

There are two principal ways of fitting these implements with hafts: the head may be fixed in the haft, or the latter may be placed in a hole in the stone called an *eye*. Another simple mode of hafting an adze is to tie the stone to a bent-headed haft.

Hammers. Two chief kinds of hammer can be distinguished, viz., those used as tools (in flint quarries or copper mines) called *mallets*, and those used as weapons, called *clubs* or *maces*.

Mallets were generally hafted by means of a thick thong around them, but sometimes the haft itself was bent round the stone. They often had one or more grooves to facilitate this hafting (*grooved mallets*). Maces or clubs of smaller size were sometimes grooved, but more often perforated with an eye for hafting.

Pieces similar to mallets and clubs were often made into weights for nets, anchors, digging-sticks, etc.

The Study of Bone Implements

Bone and deer-antler—a similar substance—were used in most primitive industries, but not generally to any large extent. They do not make good cutting-edges but only good points, and this restricts their use.

Apart from the chance breaking of bones in the search for marrow the normal mode of working, especially in the case of antler, involves sawing, scraping, and abrasion. Sawing is done with a stone implement, the material being comparatively soft. The modern type of saw, the

teeth of which form a row of gravers one behind the other, is not possible in flint, and the graver, which may be regarded as a single-tooth saw, was employed instead. For cross sawing a circular cut could be made with a single blade and the process completed by bending. Lengthwise sawing was done by making grooves with a

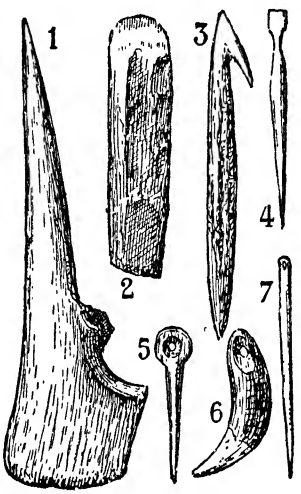

FIG. 13. EXAMPLES OF BONE-WORK

1, dagger made from a leg bone; 2, chisel; 3, antler harpoon; 4, flanged needle; 5, headed pin; 6, perforated tooth; 7, eyed needle.

graver. Shaping was performed by scraping with a flint and often completed by rubbing on sandstone.

The principal types of bone and horn implements are as follows: awls and daggers made of a pointed splinter or a bone that has retained an epiphysis that is convenient for grasping, such as the leg bone of an ox; arrow-heads, arrows, javelins, and harpoons—mere pointed splinters or more highly developed forms with many barbs; axe-sheaths used as a means of fixing stone axes to their

wooden hafts (Fig. 27); picks, pointed or edged (the latter generally called 'axes'); and small objects such as needles, fish-hooks, and so forth.

The Study of Pottery

There is an entire school of prehistorians who have taken the study of pottery as their archæological guide. Search has been made in this realm for a 'master fossil' that would enable the successive periods to be classified. But that brings us up against serious difficulties. Similarities of texture, shape, and ornament between the pottery products of different countries are hardly conclusive in the case of industries at a low stage of development, for convergence is quite possible. As for chronological indications, we are hindered by the fact that in the same country certain shapes and simple methods have continued, even while very important developments were being made. Conversely, in the same period and among peoples of entirely similar culture special kinds of pottery have been evolved in districts favoured in respect of the raw material.

All primitive methods of working baked clay have points in common and are very similar to one another. The raw material is clay mixed with certain agents to make it less sticky. Pure clay, which is greasy to the touch, contracts considerably when baked, and this produces cracks. If inert grains like sand are mixed with it they distribute this contraction and cracking is avoided. The agents used varied according to place and period, and an examination of them may lead to the determination of origin. Powdered charcoal was often used for this purpose and for colouring at the same time. The mixture of clay and the 'degreasing' agent was sometimes made by nature so that primitive man collected it ready for use.

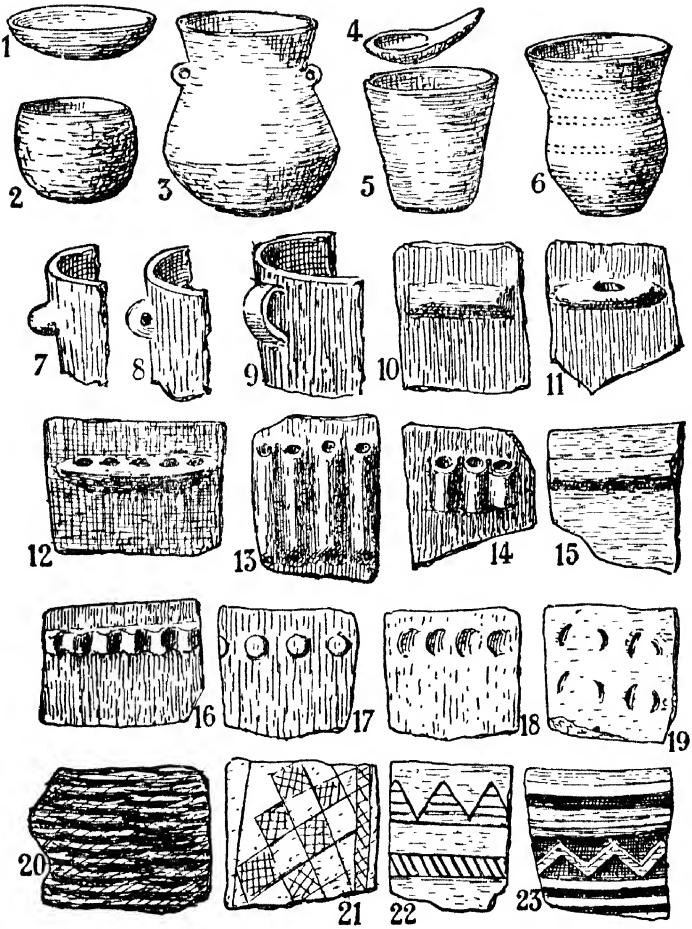

FIG. 14. POTTERY

1–5, types of primitive vessels (1, flat; 2, calabash type; 3, cooking-pot; 4, spoon type; 5, flower-pot type, or truncated cone; 6, caliciform or bell-shaped, 7–14, types of handles: 7, nipple; 8, nipple, perforated; 9, ribbon; 10, solid elongated; 11, perforated elongated; 12, multiple perforations; 13, 14, tubular and pan-pipe; 15, rim; 16, rim, festooned or wavy; 17, pellet ornament; 18, finger-prints; 19, nail-marks; 20, wicker imprint; 21, graved ornament; 22, incised ornament; 23, excised ornament.

After a more or less thorough kneading, sometimes with the aid of a stone pestle, the workman proceeds to the hand moulding. Sometimes he starts at once with a mound of clay placed on a stone or an old potsherd, hollowing it out with his fingers, and shaping it with the aid of a stone inside and a wooden scraper outside. Sometimes he begins by preparing rolls of clay which he then coils one on the other, sticking them together to make a vessel. This is next put to dry, slowly enough to prevent cracking, and even in very primitive pottery the procedure generally ends with a smoothing process. This is done when the paste is dry enough not to yield to pressure, but still slightly moist, so that the surface is pressed down and takes a gloss under the action of a smoothing-tool of wood, stone, or bone. If the paste is too coarse to be treated thus the vessel is covered with a thin layer of fine clay called *slip*, by dipping it in a clear clayey wash, and the slip then takes the smoothing.

The simplest kind of *baking* is done with an open fire. The pots to be baked are piled in a small heap, on which are thrown first twigs and then dry branches. The fire is lighted, fed with a little more fuel, and then allowed to go out. The pots are taken out while still warm and rubbed with a resin or similar substance which makes the paste impermeable. To preserve the pots from direct contact with large embers and naked flames the pile is sometimes covered with old potsherds—the earliest foreshadowing of the *oven* that was and still is used at all stages of development.

The vessels were often fitted with handles, formed sometimes by drawing out the surface of the clay in one place to make a slight protuberance or *nipple*, and sometimes by affixing a solid handle or one made of a flat piece of clay rolled into a loop (*ribbon* handle). The join

is generally imperfect and recognizable, especially after breaking. The nipples or solid handles were sometimes perforated with a stick to make a small hole so that a thong could be passed through (*funicular* handles).

Pottery was often ornamented in the paste or else painted. Ornamentation in the paste is done by *impression*, by *incision*, or by *addition*. The commonest impressed patterns are finger-prints, with or without the nails, set lightly on the fresh paste (ungual or digital impressions); *wicker* imprints; and *corded* imprints. Incised ornament was applied sometimes while the paste was still fresh, sometimes when it was dry, and sometimes even after baking. In some cases wide and deep incisions were made, to be filled in later with a contrasting material such as lime. As part of the material was removed this kind of decoration has been called *excised* ornament. That which was lightly carved or *graved* in the hardened paste may be called *graffito* ornament. Decoration by addition is generally done by *pellets* or little ribbons of clay placed flat or *festooned* by pinching between the fingers.

Painting, which is found only when the ceramic art is fairly highly developed, is ordinarily done on 'slip.' The colours consist of earths or minerals pounded and mixed with water, and are applied with a hair paint-brush used almost flat. *Ochre*, which gives a red colour, and *manganese dioxide*, which gives black, are the most usual colours, together with the white clays (kaolin).

PART II

CLASSIFICATION AND CHRONOLOGY

CHAPTER I

HISTORICAL AND CRITICAL OUTLINE

THE principal object of prehistory is to establish the chronological order of facts. Such chronology, however, can only be a relative one—an order of succession—save in exceptional circumstances, and the facts we are concerned with are of different kinds. Some relate to man as a physical being: they are questions of species and human races. Others are concerned with man from the intellectual and moral point of view: the development of his knowledge, industry, social organization, ceremonies, and so forth. Others again relate to his environment—the fauna, flora, and climate of the surroundings in which he lived and which determined his activities and influenced his development.

There has naturally been a desire to select one order of facts as more important than the rest, to establish its chronology, and then to bring other kinds of facts into the division thus formed. But there are two great difficulties in the way. First, which is the most important order of facts? Every one has decided this question according to his own personal make-up: there is no such order of importance in nature. Second, supposing that agreement *is* reached as to the relative importance of different kinds of facts, the one considered the most important will not perhaps be the easiest to study, and

will therefore not be the one that gives the best results in practice.

Shall we try to study the different kinds of facts simultaneously, without giving the preponderance to any? In that case we should risk entanglement in the complications arising from the fact that their variations are not concomitant, and that the degree of certainty attained is not the same for all. So from the theoretical point of view no one method is indicated. Let us see what has actually been attempted and, to begin with, what has been on the whole the development of knowledge and the evolution of ideas on this subject.

Ancient Conceptions and Early Knowledge of Primitive Humanity

The story of the creation and progress of man was first explained by legends in each religious system.

Lucretius, following some of the Greek philosophers, but more completely than they, endeavoured to draw a rational picture of the development of human progress. Broadly speaking, he shows that the first men lived as wild beasts and that the discoveries which led them out of primitive savagery arrived one after the other. In the beginning men used stones and sticks, then bronze, and then iron. The following lines, in which he gave clear expression to this conception, are constantly quoted:

> Prima arma ungues dentesque fuerunt
> Et lapides et item sylvarum fragmina rami.
> Posterius ferri vis est aerisque reperta;
> Et prior aeris erat quam ferri cognitus usus.[1]

[1] Man's earliest weapons were his teeth and nails,
And stones and branches torn from out the woods;
Later the power of iron and bronze was found;
Bronze first and iron next he learned to use.

How did Lucretius arrive at this idea? It is highly probable, though he does not say so, that the example of savage peoples dwelling on the edges of the civilized world and the legendary memory of bronze weapons were enough to lead him to it. But these ideas were completely lost during the Middle Ages.

At the *Renaissance* it was asserted by Aldrovandi (1522–1607), the great naturalist of Bologna whose work was published in 1648, that stone weapons were employed by the ancients, and he depicted a flint arrow-head. But it seems to have been chiefly the discovery of America that led ingenious minds to draw comparisons between the shaped stones found in Europe and the implements and weapons of existing backward peoples practising a stone industry. This was done by Dr Plott in his *History of Staffordshire* in 1686. The notion, attributed to anonymous writers, was expressed in the posthumous work, published in 1717, of Mercatus, physician to the Pope (1541–93), and in 1724 the Jesuit Lafitau wrote a whole book on the customs of the American savages compared with the customs of the earliest times.[1] So comparative ethnography was the foundation of the earliest correct interpretation of prehistoric documents.

Eckart in 1750 in *De origine Germanorum* and the judge Goguet in 1758 in his *Mémoire sur l'origine des Lois* both put forth the notion, already formulated by Lucretius, of the use in succession of stone, bronze, and iron. The same idea, founded on numerous documents, was used by the Danish archæologists Thomsen (1833) and Worsace (1844) as a basis for classifying the antiquities of their country in the Museum of Antiquities at Copenhagen. It was called *the Law of the Three Ages.*

The earliest classification, then, was an archæological

[1] *Mœurs des Sauvages américains comparées aux mœurs des premiers temps.*

one, and seems especially to have met the need for classifying collections in museums. But it applied only to comparatively recent periods.

While this conception of the stages of industrial development was being established without any great difficulties and without any clashes, and was joining on to the periods of classical antiquity an earlier period when weapons were made of stone, another conception, of a very different philosophical complexion, was beginning to appear—that of 'high antiquity' or the 'geological' antiquity of man. In 1797, at Hoxne in Suffolk, John Frere discovered some worked flints in a bed of gravel containing the remains of large extinct mammals, and it is to his credit that he had the courage to draw the conclusion that his find went back "to a very remote period indeed," much further back than the world of to-day. But he did not stress the point and no one took any heed.

Various investigators in the south of France—Tournal (1827) in the Department of Aude, de Christol (1829), Émilien Dumas, Marcel de Serres in the Cevennes—and the Belgian Schmerling in the Province of Liége excavated caves and found human remains, skeletons and relics of industry, along with the remains of extinct animals (bears, reindeer, etc.), and they declared that the two were contemporaneous. Unfortunately the official scientists, the principal geologists, were not convinced, for they thought that mixing was possible in the filling in of caves. As a matter of fact it seems in the light of present-day knowledge that the connexions which these early excavations claimed to have established were often inaccurate.

The credit for leading the world of science to recognize the high antiquity of man belongs to Boucher de Perthes, a savant of Abbeville. Starting from the idea that human remains ought to be found in "diluvial deposits," he ended

(1844–45) by discovering in a deposit of ancient alluvium on the Somme, near the hospital of Abbeville, some worked flints and an elephant's tusk. He had to fight for several years to get scientists to admit the truth that he proclaimed, but he was definitely successful between 1859 and 1864, with the help of the great English scientists Sir Joseph Prestwich, Sir Charles Lyell, Hugh Falconer, and Sir John Evans. It must be acknowledged, however, that there was some excuse for his opponents, because the truth that he presented was mixed up with error, and particularly because he was sometimes the victim of fraud. The principal hostility that he had to overcome, however, was due to the religious beliefs of those who considered that he was contradicting the Bible.

Various Attempts at Classification

When once the geological antiquity of man was recognized a new and enlarged framework was drawn, within which the classification of facts had to be undertaken. Various attempts were made, starting from all possible bases.

(1) **Palæontological Classification** (Lartet). Since the antiquity of man had just been demonstrated by that of the fauna that was contemporary with him, it was natural enough to keep to that idea and establish the chronology of the ancient period of humanity according to changes in the fauna. It was naturally a palæontologist who launched the notion of a palæontological chronology. Édouard Lartet (1801–71) proposed in 1858 to classify the deposits where traces of fossil man had been found according to the fauna connected with them, this being characterized by one principal feature. "In this way," he wrote,

we shall have for the period of primitive humanity the *Great Cave Bear* age, the *Elephant and Rhinoceros* age, the *Reindeer* age, and the *Aurochs* age, very much as the archæologists have recently adopted the division into the stone age, the bronze age, and the iron age.

Lartet had his disciples, such as Hamy, and particularly his rivals or critics—Boyd Dawkins in England and Dupont in Belgium—who wanted to modify his divisions while retaining the classificatory principle. But these attempts were short-lived. The purely palæontological classification was faced by difficulties that were actually fatal defects. To begin with, there were differences in the fauna even of neighbouring countries at the same period, caused by differences in altitude, the nature of the soil, and so forth. Then there was the large number of species common to the Quaternary faunas and to later ones. Finally—and from the practical point of view we might say *particularly*—there was the difficulty—through lack of a sufficient number of documents—of knowing exactly what *was* the fauna corresponding to a human layer. The absence of the element regarded as characteristic proves nothing unless checked by large quantities of fossils, and there are generally very few faunal remains associated with relics of man and his industry.

Nothing now remains of Lartet's classification except the term *Reindeer Age*, which is a convenient one to designate a phase when the climate had a very special character in Western Europe. But palæontology continues to intervene in order to provide special information and for the assistance it gives to geology.

(2) **Archæological Classification.** Since historic periods are divided according to the doings and the works of man it seems only reasonable to employ the same method in protohistory and prehistory. But the

problem that most frequently faces the student of human remains, and especially the curator of a museum, is to know where to place a given specimen of human industry. The same need that led the directors of the Copenhagen Museum to make an archæological classification of comparatively recent ages whose documents they possessed led Gabriel de Mortillet, when he was entrusted with the arrangement of the prehistoric collections in the French Museum of National Antiquities at St-Germain-en-Laye, to make a similar classification for all periods. Keeping the division into the three Ages of the Danish archæologists he set up in 1867–69 a series of subdivisions of the Stone Age. In order to define the successive phases he made use of variations in the types of weapons and implements as well as of variations in technique. The thing made by man, such-and-such a type of implement, became the *characteristic fossil* of a human level. The value of the fossils was determined, as in geology, according to stratigraphical observations, and the layers or levels were named after a typical deposit: the *Mousterian* level is the one of which there are remains in the caves of Le Moustier, and so forth.

The drawback of this method is that human industry was not homogeneous at any given period. We have to reckon with a certain amount of freedom and individuality among men and groups of men, with variations caused by differences in the raw material and in the mode of life, and also with cases of retarded development, of which there are such striking examples at the present day.

Geology, from its experience of fossils of the animal and vegetable kingdoms, is already acquainted with the complications created by the conception of *facies*, but archæology, with its fossil relics of human industry, is still more affected by it. Despite this principal difficulty,

however, the archæological classification still remains the one with most means at its disposal to guide us in the study of prehistoric periods. The classification of Gabriel de Mortillet, gradually put into shape by its author and receiving finishing touches at the hands of others—sometimes with more or less useful complications—is still in use (see p. 96).

(3) **Geological Classifications.** The leading idea in these classifications is to study man like other fossil species within the outline provided by the succession of geological events.

Despite the theoretical unity of geology two different solutions have actually been reached in regard to the study of the Quaternary period—the period in which man was present—viz., to establish our subdivisions by reference to *glacial* phenomena or by reference to *marine* ones.

(*a*) **Division according to Glacial Phenomena.** In the course of the early geological periods the position of seas and lands changed considerably: marine deposits were a great deal more extensive than continental ones, and marine fossils are enormously abundant and widespread. There has therefore been a tendency to set up geological subdivisions by reference to marine deposits. But since the Quaternary period, on the contrary, the shape of the continents has undergone little change, so that the marine deposits that have become accessible are very rare. The marine species also have remained practically the same. All this makes the study difficult, and since in addition what interests us most in this period is man and his environment, there is a temptation to abandon the sea and its fauna and take continental formations as the foundation of our study. Now it actually happens that the Quaternary period was marked by terrestrial

phenomena of great importance—the movement of the glaciers. Successive glacial advances and retreats caused great changes in conditions of life over a wide area in the whole of the northern hemisphere, and these movements produced important detrital formations.

For all these reasons most geologists have considered that the history of the Quaternary period ought to be written with reference to the history of the great glacial phenomena. Attempts to trace the order of succession were made by Geikie in Northern Europe and by Penck in the Alps. The chief difficulties of this system and the objections that might be made to it arise first from the absence of uniformity in the glacial phenomena, which are connected with local meteorological conditions: there is no *a priori* proof that the maximum extension of the great North European glacier coincided with that of the Alpine glacier. Moreover, glaciers are subject to continual oscillations, large and small, short and long, and it might be difficult to distinguish between the traces of a strong local oscillation and those of two glaciations separated by a real interglacial period—*i.e.*, a period of sufficient length, and corresponding to a climatic change of sufficient importance, to permit of the establishment of a new fauna. Again, glacial formations are generally devoid of fossils, so their position and degree of weathering are the only means of trying to date them, and this is often insufficient. Finally, the erosive power of a glacial advance is so great that the surface deposits, and in particular the traces of previous advances, are often destroyed.

Taking it all round, therefore, the difficulties are such that after fifty years of study to which the greatest geologists have devoted all their energies, there is no certainty yet as to the exact number of glaciations and

the way in which the faunal changes are related to them. (See p. 93.)

(*b*) **Division according to Marine Phenomena.** Between 1918 and 1922 an endeavour was made by Depéret to fix the chronology of the Quaternary period by reference to marine phenomena. He argued in favour of this method that since the whole of geology is based on the study of marine formations it is only reasonable to continue for the latest period what was done for the others, and also that there have been important changes in the marine level since the beginning of the Quaternary period. These should therefore be taken as the bases of the classification.

We have seen already the principal *a priori* objections that might be made to this method. We may add to them, after Depéret's attempt, that the difference between the various levels regarded as characteristic is relatively slight (from 40 to 115 feet) and that in the absence of characteristic fossils—a frequent occurrence—the causes of error in judging the marine level by reference to the level of early coastal deposits are of the same order of magnitude as the differences on which the classification is based. Indeed, a coastal deposit may have been formed beneath a limited depth of water of a few feet, or on the other hand at a level corresponding to that of the highest tides. Moreover, local orogenic movements have often intervened at a later date than the displacement under consideration.

On the whole, then, the merits of Depéret's classification lie particularly in its clearness, which makes it easy to explain. It is difficult to make use of it in practice, and even to verify its accuracy, and it seems to be in course of being abandoned.

(4) **Mixed Classifications.** The practical difficulty

of placing all the facts in divisions made with reference to a single aspect has always led to the employment and mixing of different orders of facts so as to draw chronological conclusions from them. This procedure was systematized by Boule, who in 1888 proposed "a classification of the Quaternary period based on the utilization and co-ordination of the three kinds of knowledge" —stratigraphical, palæontological, and archæological. To geology and palæontology he assigned the *rôle* of establishing the general framework within which the archæological subdivisions would be placed.

Conclusion. There is no doubt that all the information at our disposal should be utilized, but when a building is made of materials of very different kinds they are not put together haphazard. Again, considering that while these studies are in progress they are constantly receiving supplies of new discoveries, care must be taken not to mix up facts of different kinds, which would make rearrangement too difficult.

The idea arrived at is this: researches of different kinds, such as the study of glaciations, of marine oscillations, and of the order of succession of the stone industries, should be pushed on, at first separately. Note also that in each of these departments it is stratigraphy that will yield the surest and most numerous facts. But while pursuing these separate investigations their results should be compared and an attempt should be made to find connecting links between them. What will actually happen is that for the earliest periods our principal source of information will be geology, aided by palæontology, while for later periods archæology will have the field almost entirely to itself.

CHAPTER II

PRINCIPAL CLASSIFICATIONS FOR WESTERN EUROPE

I. Geological Classifications

(*A*) **Classification by Reference to Marine Phenomena** (Depéret). The existence of 'raised beaches' has been known for a long time—*i.e.*, strips of sand or shingle exactly like present-day beaches but situated at various heights, sometimes over three hundred feet.

De Lamothe has shown (*a*) that these deposits are arranged in order of age, the oldest being the highest, and (*b*) that each line of beach is the result of a lowering movement followed by a raising movement leading to a deposition of which it is the last phase.

Depéret made his classification by relying on the work of Gignoux. In the western Mediterranean, he said, there are four marine terraces "fitted one upon another in steps of diminishing height: 300 to 330 feet; 180 to 200 feet; 100 feet; and 50 to 60 feet." These terraces form four distinct stratigraphical units, each corresponding to a complete cycle of sedimentary deposition and resulting in a line of beach of fixed height. The terraces are distinguished as follows:

(1) **Sicilian** (300 to 330 feet), taking its name from the ancient Gulf of Palermo in Sicily, called La Conca d'Oro (the Golden Shell). The fauna includes cold-water shells: *Cyprina islandica*, *Mya truncata*, *Panopæa norvegica*, etc. This cold fauna is absent, however, in corresponding deposits on the coasts of France, Italy, and North Africa, and is replaced by the ordinary Mediterranean fauna.

(2) **Milazzian** (180 to 200 feet), from Milazzo on the

north coast of Sicily, where the level is marked by marine conglomerates as on the African coast between Oran and Bône. Here the work of marine erosion is often very pronounced owing to the existence of littoral platforms, shelves, or coastal plains.

From the palæontological point of view the most striking feature is the abundance of varieties and the large size of the shells. They belong to species now living in the Mediterranean, but they are larger and their ornamentation is more elaborate. For instance, the variety *herculea* of *Mytilus galloprovincialis*, the large size of *Pecten pesfelis*, etc., are indications of a warmer sea than the Mediterranean to-day.

(3) **Tyrrhenian** (90 to 100 feet), from the name of the Tyrrhenian Sea. This level is the one that geologists have for a long time called the *Strombus beds*, from the presence and abundance of *Strombus mediterranæus* (the modern *S. bubonius*). It is well characterized from Oran as far as Cyprus and all round the Mediterranean by the migration into this sea of a fauna with subtropical affinities, whose representatives still live in the Canary Islands and on the Atlantic coast of Africa: *Strombus bubonius*, *Conus guinaicus*, and *Tapes senegalensis*. But alongside these species there are others to be met with that belong to the temperate Atlantic: *Pecten maximus*, *Venus fasciata*, and *Tapes rhomboides*.

(4) **Monastirian** (60 to 65 feet), taking its name from Monastir in Tunisia.

The Mediterranean fauna splits in two. On the south coast, in Africa, it remains very much what it was in the Tyrrhenian level, but on the north coast it becomes an ordinary Mediterranean fauna similar to that of to-day. This indicates a very marked difference of climate between the two coasts.

After basing this classification on the Mediterranean basin Depéret set out to show that it was applicable also to the Atlantic coasts of Europe and Africa. We have already mentioned the general criticisms that may be levelled against him (see p. 85).

At the present time Gignoux wishes to keep only two terms of this classification, viz., the *Sicilian* and the *Strombus beds*, which, he says, are the only ones that the faunal characteristics justify. With regard to the question of altitude, this geologist stresses the importance of the local movements that have taken place since the beds were deposited. For instance, the Sicilian sea, which at Palermo was 265 to 330 feet above the present level of the sea, was below that level on the coast of France.

(*B*) **Classification by Reference to Glacial Phenomena.** Numerous traces are to be found in Europe of early glacial extensions. Near Lyons, for example, there are important moraines marking the line reached by the Rhône glacier. A comparison of the present surface of this glacier with such a development of it gives a preliminary idea of the changes that have taken place. In some places, again, we find one moraine on top of another, and it is clear that we have to deal with moraines of different epochs, not only because the appearance of the mixture of materials is not the same, but by reference to the extent of their weathering. Even when the boulders of the upper moraine are intact we find fragments of much weathered and 'rotten' rock in the lower one. This proves the existence of distinct glacial periods and gives an idea of the great length of time that may have elapsed between them.

The prehistorian cannot leave entirely to the geologist the task of studying the Quaternary glaciations, and content himself with the results for the purpose of

classification. It is his business, in fact, to picture to himself as accurately as possible the conditions of life in every epoch in which man has lived, and for his field researches he needs to know how the signs of glacial phenomena show themselves. The preliminary knowledge for this study is furnished by an examination of existing phenomena.

Examples of Glacial Phenomena at the Present Day. (*a*) *Glaciers.* It is only in mountains that glaciers are found to-day outside the polar regions. These masses of ice, fed by falls of snow in their upper parts, move slowly, and their extension is limited by melting or *ablation.* They cover and carry away materials of every kind and size which they mix and grind up to a varying extent. These materials at length accumulate at certain points and form *moraines.* What we actually see are chiefly sloping heaps, moraine walls, formed either on the edges of the ice-stream (*lateral* moraines) or at the junction of two streams (*longitudinal* moraines). Marginal moraines deposited in front of the glacier are called *terminal* moraines, and those on the banks of the stream are called *riparian* moraines.

Glaciers are powerful agents of erosion because by their great volume they tear away material that is not very solid, and because of the abrasive action of the rock debris that they carry with them. The effect of this is to scratch and hollow out the containing walls, while the debris itself becomes similarly scratched through being rubbed together. The general result of glacial action is therefore shown in the hollowing out of valleys with rounded bottoms and vertical sides (*i.e.*, U-shaped, in contrast to the V-shape that results from torrential or fluviatile erosion); by the mixture of materials not arranged according to size, clay, sand, pebbles, boulders, and large blocks being deposited higgledy piggledy; and, finally,

by the fact that the boulders as well as the enclosing rock walls are characteristically scratched or *striated.*

(*b*) *Inlandsis.* In polar lands, and especially in Greenland, there are glacial phenomena on an entirely different scale—one that necessarily recalls the Quaternary glaciations in Europe. An ice-cap, called *inlandsis*, covers the whole country, only a narrow fringe of land remaining free here and there in the neighbourhood of the sea. A few rocky peaks, called *nunataks*, too steep for the snow to rest on their sides and too high to be buried, emerge in places. The thickness of this ice-cap in the centre is in the neighbourhood of 6000 feet. The action of such a mass is obviously to wear away and round off all projections on the ground over which it drags itself. Scandinavia, the last region evacuated by the Quaternary *inlandsis*, shows this worn appearance where only massive and rounded forms have been able to survive: even in detail the rocky soil appears 'sheep-backed.' It is everywhere covered to some extent with debris representing the base moraine—the formation known in England as *boulder-clay.*

(*c*) *Fluvio-glacial systems.* Beneath the ice mass flowed here and there actual rivers. These *subglacial streams* deposited alluvium, formed from morainic material, whose general direction is at right angles to the ancient front of the glacier. These deposits are given the Swedish name *ås*, plural *åsar* (pronounced *ōs*, *ōsar*).

More commonly the melting of the glaciers gives rise to streams of water on the outside. These start from the moraine walls and carry off part of their materials, which they change by rolling them, and finally deposit them, arranged more or less according to size, in alluvial beds. What we see, then, is the union arising from the gradual passing of the moraine to the fluviatile deposits: the

morainic amphitheatre is joined by a *cone of transition* to the fluviatile layers which spread out into the valleys (Fig. 15).

Sequence of Quaternary Glaciations. (*a*) *Stratigraphical facts.* We have seen (p. 89) what conclusion could be drawn from the superposition of moraines of different degrees of weathering, and the existence of such phenomena as tufa, lignite, and deposits of fresh water intercalated between formations of glacial origin tells the same tale.

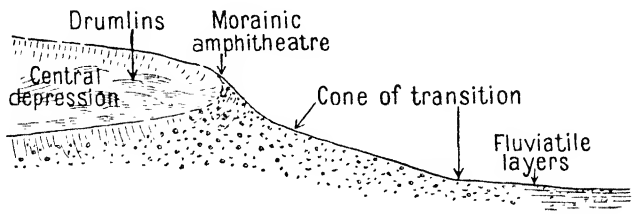

FIG. 15. DIAGRAM OF A FLUVIO-GLACIAL SYSTEM

(*b*) *Topographical or morphological facts.* Early terminal moraines have been observed at different distances from the feeding-centre of the glacier indicated by the existing residue. The most distant ones are called *outer* moraines and the others, generally situated in the valleys themselves, *inner* moraines. It also happens that fluviatile deposits at different heights corresponding to successive stages in the formation of a valley are found to be joined to different moraines, and the relative age of these formations is thus indicated.

Classifications already made. Two great glacial masses, though greatly differing in importance, have extended over Europe. The principal one, a real *inlandsis*, covered the whole of the north and was fed by the mountains of Scandinavia and Scotland, while the other remained very much divided and relatively confined, formed by the extension of the Alpine glaciers.

Great Northern glacier. The Scotsman Geikie established in 1875 a series of six glacial periods named as follows, beginning with the earliest: 1. *Scanian*, 2. *Saxonian*, 3. *Polonian* (or *Polandian*), 4. *Mecklenburgian*, 5. *Lower Turbarian*, 6. *Upper Turbarian.* The first Scanian-Saxonian interglacial period is called *Norfolkian* or *Cromerian* and corresponds to the recognized level of the *Cromer Forest-bed.* But different observations have led many German geologists to agree with Keilhack in admitting only three great glaciations. For instance, a boring made in the outskirts of Berlin which cut the glacial formations to a depth of 560 feet met with only three moraines, separated by thick deposits of sand, loam, etc. The last four headings of Geikie's classification would then relate to mere oscillations, or stages, of the last great glaciation. The three great Nordic glaciations are named by the Germans after the valleys of the *Elster*, the *Saale*, and the *Vistula*, where they have been defined or most fully studied.

Alpine glaciers. Penck in 1901 and Penck and Bruckner in 1909 endeavoured to establish the existence of four layers of pebbles connected with moraines of different heights. This would show the succession of four glaciations separated by periods of erosion corresponding to the interglacial periods. These glaciations, named from the places where their traces were studied, are as follows, beginning with the oldest: 1. *Günz*, 2. *Mindel*, 3. *Riss*, 4. *Würm* (or *Günzian*, *Mindelian*, *Rissian*, and *Würmian*).

This terminology is the one most generally adopted and has become the standard one. The very early Günz glaciation, however, is considered of minor importance, which brings us back to three chief glaciations corresponding to those of the north. But their study is rendered difficult by the absence of fauna in the formations studied, the scarcity of stratigraphical facts, and the possibility

that the maximum extensions may not correspond from one point to another.

Conditions of Life in the Glacial Periods. The idea that in a period of great glacial extension the climate must have been a very cold one is often taken for granted, and quite naturally. But in actual fact cold is neither necessary nor sufficient to cause the development of glaciers in a country. It is not necessary, for there are glaciers in New Zealand and in Chile which flow right into a zone of temperate or even subtropical vegetation (tree ferns). Neither is it sufficient, for there are no glaciers in the frozen lands of Northern Asia—the *tundras*. The real conditions for the development of glaciers appear, therefore, to be an abundance of atmospheric precipitation —*i.e.*, a humid climate—and the presence of mountain masses in which condensation is produced in the form of snow. It may be noted also that a temperate maritime climate without great winter cold but without great summer heat will permit at the same time of the extension of glaciers and of the development of a flora regarded as 'warm' because it has little power of resisting cold.

An observation made in North America where the Quaternary glaciations occurred also, enables us to reckon what may have been the approximate fall in temperature when glacial extension was at its maximum. The upper Mississippi valley was not reached by this extension but is near the old morainic front. Its average temperature to-day is 5° Centigrade, so in the glacial period its temperature must have been less than five degrees lower than at present, otherwise the melting would not have taken place.

From these observations there emerge two ideas: (*a*) a temperate or even warm fauna and flora may exist in countries near to great glaciers; (*b*) the equilibrium of

glaciers is not very stable: a comparatively moderate increase of atmospheric precipitation and a slight fall in the average temperature would suffice to produce a new glacial development.

Connexion between Glacial and Marine Phenomena. (*a*) **In Regard to their Geological Traces.** In theory this connexion is easy to understand: the rivers are connected with glaciers at their source and with the sea at their outlets, so the fluviatile deposits will be strips of gravel connected with moraines upstream and sea-beaches downstream. But in practice the question is very difficult because of the gaps in the formations, the unequal erosion that takes place during the same period in valleys of different slopes and in the same valley above and below a ridge of rock, and so forth.

(*b*) **In Regard to their Causes.** In phenomena on such a large scale as those we are considering the deposition of masses of ice on land areas may have two results: (1) The land area sinks when subjected to overloading. It is probable, indeed, that in view of the relative thinness of the earth's crust and its folded and cleft condition it behaves like a series of compartments in *isostatic equilibrium.* (2) The sea sinks when it loses the mass of water transformed into ice.

These two results are opposed to each other in producing the final result—the relative level of the sea and the continents. While the consequences of the sinking of the sea are general, the land subsidence will be localized. What must have happened, then, is this—and it seems to be confirmed by the rocking motion of the 'Scandinavian shield.' When the ice melted the continental part rose up on being set free, and rose much more than the sea. (In Scandinavia, indeed, there are early beaches which have been raised as much as a thousand feet.) The

opposite process took place in those parts of the continent that were always free from ice: they were affected only by the rise in the level of the sea. It is certain, however, that many other causes may have actually intervened to modify the relative positions of the sea and any particular land mass. On the whole there is no proof of any precise relation of cause and effect between the development of glaciers and changes in the sea-level, and the synchronisms are difficult to establish.

(*c*) **Results obtained.** According to Depéret, the connexion between the marine and glacial periods is as follows:

Günz = Scanian = 300–330 foot level (Sicilian).
Mindel = Saxonian = 180–200 foot level (Milazzian).
Riss = Polonian = 100–115 foot level (Tyrrhenian).
Würm = Mecklenburgian = 60–66 foot level (Monastirian).

According to German opinion (Keilhack), which is fairly commonly followed to-day, reducing the number of glaciations to three, the relation would be:

Mindel = Scanian = 180–200 foot level.
Riss = Saxonian = 100–115 foot level.
Würm = Polonian, etc. = 60–70 foot level.

But that is assuming that the periods of rising sea-levels do not correspond to interglacial periods, for reasons just indicated. It will be seen that there is still much uncertainty with regard to the geological divisions of the Quaternary period.

II. Archæological Classification

The archæological classification formulated by Gabriel de Mortillet, in accordance with observations made chiefly in France, has been generally adopted and has

furnished a standard of comparison for all later studies in other parts of the world.

One preliminary remark is necessary. De Mortillet and those who followed him not only sought to discover the chronological order of successive industries, each defined by its special characteristics, but they seemed dominated always by the idea that this order confirmed the *law of progress*. That is the name given to the fact, manifest throughout the historic period, that human knowledge and the industrial crafts that result from it have been constantly increasing and improving. The growth of knowledge in a child in proportion to the experiments he makes in contact with nature seemed to provide a standard of comparison also for the development of human industry. This conception has often been utilized, in the absence of stratigraphical data, to establish the relative ages of stone industries by reference to their apparent degree of perfection.

Now that is a mistake. If the law of progress is indeed correct in broad outline it is not so in small details, or even in big ones. In historic times what followed the civilization of the Pharaohs and the Roman Empire? There was marked retrogression. And apart from general retrogressive movements we constantly see a particular one affecting some industry or other. Now, we know scarcely anything of the industry of prehistoric man except the stone one, and that this is a bad standard by which to measure the general development of knowledge and civilization is proved by the example of the peoples of America and Oceania at the time they were conquered. The stone or shell implements and weapon-points were frequently no better among peoples at a much higher stage of social organization, economic, agricultural, and artistic development, and so forth. No explorer ever

conceived the idea either of judging a people by the shape of its stone implements or even of attaching importance to such small details. The construction of great monumental or naval works, the cultivation of the soil, and so forth, seemed to have no relation to such things as these.

In agreement with these ethnographical observations it is clear to every unprejudiced mind that the late stone industry, named after Le Campigny and collected on the surface of the loam in Northern France, seems different from, but neither finer nor more skilfully worked than that collected at the bottom of the earliest of these loams, earlier at the very least than the Würm glaciation, and the work of men of a very inferior race.

The Stone Age has been divided into two periods—the *Palæolithic* and the *Neolithic*—the distinction being based on the custom in the latter period of polishing the stone. They have sometimes been called the age of *chipped stone* and the age of *polished stone*, but these terms are not good ones, for stones worked by flaking were used in every period, and even in the Neolithic period they were far more numerous than polished ones.

Within these two main divisions industrial levels have been fixed, bearing the names of the deposits taken as typical, with an adjectival termination added. There has been a marked tendency for some years to make new names to replace the old ones, or particularly to be added to them, with the ostensible object of choosing more typical deposits, or of marking industries regarded as 'new' ones because they differ more or less from the standard ones. Now this tendency, not always divorced, perhaps, from the mere desire to play the part of a creator, is an extremely unfortunate one, for it leads to warfare about words and useless complications wherein

the studies become entangled and which are well calculated to dishearten the newcomer to prehistory. Without denying the usefulness of defining industries possessing particular features and naming them from the deposit that seems most characteristic, we ought to refuse the entry of new terms to the great accepted classification unless they can be shown to have general value. Otherwise the classification will be engulfed in a chaos of local varieties.

The Palæolithic period is divided fairly clearly into three parts: *early*, *middle*, and *upper*. Attempts have sometimes been made, not without a show of reason, to reduce them to two, by including the middle period in the early one, but the three-fold division seems justified.

Early Palæolithic. The earliest level (dated geologically) in which the results of undeniably human industry have been collected is that of the Somme gravels situated 100 to 130 feet above the present thalweg. Several deposits of this level have been furnished by Northern France and South-east England, but the industry met with there is already complex and comprises very well worked pieces, so it does not seem to be the earliest industry: the beginning, the dawn of stone implements, is to be sought for farther back.

The Question of Eoliths. Since the days of Boucher de Perthes, the Abbé Bourgeois, and, in later times, Dr A. Rutot, etc., there has always been a school of seekers after *eoliths*. Endless discussions have taken place on this subject, and for a long time past they have produced nothing but repetition. Eoliths are associated with a very natural attitude of mind: it is thought that before making actual implements, *i.e.*, giving a stone the shape suited to some definite purpose, man must have begun by using edged or pointed stones just as he found them.

Then, without actually altering their shape, he would adapt them by removing a few flakes, making suitable 'retouches,' and finally work out very simple shapes for himself.

Starting with this preconceived idea the searchers after eoliths go out into the areas that seem of suitable geological date and fairly easily discover pieces corresponding to their conceptions, which they think are thus verified by experience. But unfortunately it is clear that pieces similar to the alleged eoliths may be formed by a whole series of natural forces, such as the clashing together of stones set in motion by the sea, by rivers, or the melting of ice on a slope, etc., or even by pressure within the ground. It is clear also that the 'eolithic types' are found in sites far too old for the existence of men to be regarded as possible. And, finally, it is obvious that the procedure by which the impressive series of eoliths is formed always brings into play the law of large numbers. It is by a series of selections made from a vast quantity of material that the so-called 'convincing' pieces have been isolated. Thus the probability of coming across them has been brought to the same level as the probability of their being naturally formed by a freak of nature.

It is for those who make these assertions to bring forward proof. Only one kind of proof seems possible to enable us to assert that we are in the presence of actual eoliths, and that is their discovery in such a place and in such a grouping as can be explained only by their having been brought there by men, *e.g.*, around a hearth or in a cave. And such a discovery has not yet been made.

Chellean and Acheulian. The terms Chellean and Acheulian were coined by Gabriel de Mortillet from the names of the places *Chelles*, on the river Marne, near Paris, and *Saint-Acheul*, a suburb of Amiens. The antiquity

of these deposits is proved by geology and palæontology. At Chelles a strip of early alluvium of the Marne yielded a fauna comprising the straight-tusked elephant (*Elephas antiquus*), the leptorhine rhinoceros (*Rhinoceros Merckii*), and the hippopotamus, regarded as the three characteristic types of the 'warm' Quaternary fauna, together with *bovidæ*, *cervidæ*, and the horse. The situation of this alluvium is only about thirty-five feet above the present alluvium. At Saint-Acheul the fauna was less completely characteristic, but the height of the deposits, some hundred feet above the present level of the river Somme, seems to indicate still greater antiquity.

De Mortillet, struck by the abundance of more or less pointed or oval pieces made from flint nodules, conceived the idea that primitive industry must have originated from a pebble taken in the hand and used for hammering until some flakes broke off, making one part of it pointed or edged. To the primitive instrument thus formed he gave the name *coup-de-poing*, literally "blow of the fist." English archæologists sometimes call it a *hand-axe*, and it is the single and characteristic implement of the Chellean period. It was not till later that man would think of making flakes, these being at first the waste products resulting from the manufacture of hand-axes. This theoretical view, attractive by its clearness, its reasonableness, and its consonance with a simple conception of the law of progress, was, and still is, widely adopted. It was thought on several occasions that the deposit had been found which would yield this hypothetical crude industry whose typical product would be a hand-axe with wavy lines, indicating that heavy blows had been used in making it. But as soon as somewhat careful searches had yielded a fairly large number of pieces, there were always found, in association with implements chipped with large

flakes, other finer implements and flakes used and even shaped by retouching: this was the case at Chelles as well as at Saint-Acheul.

Continuing the investigations of Professor Commont in the early gravels of the 80- to 120-foot level of Saint-Acheul, we have found abundant examples of an industry whose homogeneity is further proved by all the transitional forms it contains. The implements that predominate are

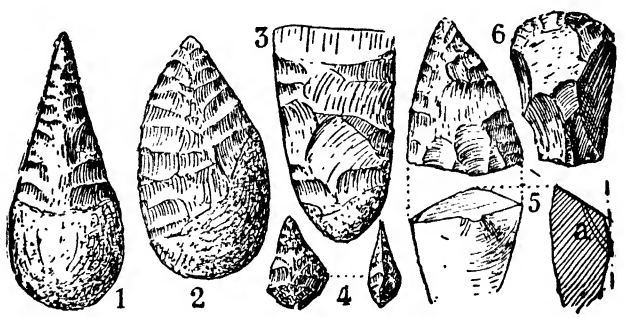

FIG. 16. CHELLEO-ACHEULIAN TYPES

1–4, double-sides (*bifaces*) (1, long point or *ficron*; 2, flat oval or *limande*; 3, basil; 4, small almond-shaped (La Micoque type)); 5, single-sided point on thick flake (front, back, and edge); 6, scraper.

those with the one common characteristic of being worked on both sides—they are double-sided—and others made from flakes by retouching on one side—single-sided. Generally speaking, the double-side consists of a more or less well-shaped butt and an end-piece carefully shaped to make an implement, such as a straight or curved cutting-edge, thin or thick, pointed or gouge-shaped, and so forth. In some pieces the butt is made by leaving part of the flint nodule untouched. It is obvious that this part is very handy to hold when using the implement, and the whole piece resembles implements recently in use among primitive peoples (Eskimos, Californian Indians,

and Australian aborigines) made of worked stones with the butt covered with mastic, leather, or woven vegetable fibre to serve as a handle. It is therefore probable that most of the Chellean double-sides were used in the same way with covered handles. It is this common feature that has given rise to the illusion, despite the varieties of shape, size, and type, and has led to the theory of the single implement.

Single-sided pieces comprise flakes forming knives, side-scrapers, end-scrapers, ogival points—in short, all the essential implements not affected by general specialization. Some pieces made from flakes with more retouches on one side than on the other form a transitional type between double-sides and single-sides.

At Clacton-on-Sea, near the mouth of the Thames, Mr S. Hazzledine Warren discovered a bed that yielded almost exclusively flakes and single-sides, exactly similar to those of the Saint-Acheul gravels of the 80- to 120-foot level. The fauna still includes the straight-tusked elephant, Merck's rhinoceros, and the hippopotamus, although the height is only a few feet. There is a similar bed at a height of 100 to 115 feet at Swanscombe, between Dartford and Gravesend.

The Abbé Breuil, faithful to the old idea of contrariety between the double-sided and the flake industries, proposed the name *Clactonian* for this early flake industry. He remarks that these are generally thick, and that the angle between the flaking-plane and the striking-plane is very wide. There are numerous facts, however, which show that at many periods there was double-side and single-side work going on at the same time. It is true that in a bed or a certain group of beds one of the two kinds so greatly predominates that it is easy to neglect the other, and we thus get a flake facies or a double-side facies,

but it is undoubtedly a single industry, whose unity is shown by common characteristic features. That seems to us to be the case with the Chellean type, or, if the term is preferred, the Franco-English Palæolithic type of the 100-foot level.

The term *Acheulian*, first used of this level, was adopted later to designate the following industry, found in particular in the early loess so much in evidence at Saint-Acheul. It differs from the preceding only in the presence of finer pieces, sometimes of magnificent workmanship, especially forms with lanceolate points and borers. In some beds flakes and single-sides are plentiful.

The name *Micoquian*, from La Micoque, near Tayac (Dordogne) is sometimes given to an Acheulian variety comprising very fine and small double-sides, and the name *Tayacian* denotes a flake variety underlying this in the same bed.

The Abbé Breuil proposed replacing the ill-chosen term *Chellean* by *Abbevillian*, but such changes are contrary to the custom of the natural sciences and should be banned. As the industry in question is closely connected with that of Saint-Acheul, of which it is an earlier form, it would be better to give up the name *Chellean* and keep only *Acheulian*, with the necessary subdivisions.

M. Passemard gave the name *Chalossian* to an industry met with at the bottom of the loams on the plateau of Chalosse (Landes) and characterized by large, pointed implements of triangular section. He thought at first that this industry was pre-Chellean, but it appears rather to be a variety of the Chellean type.

Middle Palæolithic (or end of Early Palæolithic). **Mousterian.** The Mousterian industry, named by Gabriel de Mortillet after the Le Moustier cave in the Dordogne, was essentially a flake industry with two

principal types—the 'hand-point' and the side-scraper. It is situated stratigraphically above the Acheulian, and is associated with a temperate or cold fauna comprising large furred mammals—the mammoth (*Elephas primigenius*) and woolly rhinoceros (*R. tichorhinus*)—as well as *bovidæ* and *cervidæ*, including the reindeer (*Cervus tarandus*).

As a matter of fact, the question of the Mousterian type is complicated by the existence of different facies. Sometimes, as at La Quina (Charente), there is hardly anything but flakes and single-sides, especially side-scrapers. The flakes are thick, struck from irregular cores, with a very obtuse flaking-angle like the Chellean ('Clactonian') type. Elsewhere, as in the standard Le Moustier cave, the points are of great relative importance, and the method of cutting is slightly different, for oval flakes are made from discoid or 'tortoise' cores (see Fig. 8, Nos. 6, 7). In some districts, such as Northern France, it is this method that yields the majority of the implements. Helped by the nature of the raw material, these *Levallois* flakes as they are called (from the Levallois-Perret suburb of Paris where they used to be plentiful) attain the size of beautiful Acheulian double-sides. The Abbé Breuil suggested the term "Levalloisian" for this Mousterian variety from Northern France and proposed to give it a place between the Acheulian and the Mousterian. But this Levallois flake industry continued in the north during the whole of the interval between the Acheulian and the Upper Palæolithic periods and is associated with the making of other Mousterian forms, so that once again what we are dealing with is a variety characterized only by the abundance of a type that is not unknown elsewhere.

Finally, we find in some Mousterian beds, instead of flakes and single-sides, a predominance of double-sides

that are sometimes impossible to distinguish from Acheulian pieces and sometimes of slightly different shapes, among which the predominant ones are cordate or triangular, with a very flat side. In the lower cave at Le Moustier there has been found a layer of Mousterian double-sides between two layers of standard Mousterian single-sides, which is a clear proof that we are not concerned with a mere gradual development from the Acheulian to the Mousterian type.

Then, again, there are extensive areas of Central and Eastern Europe which seem to have been unacquainted with double-side Palæolithic industry, and here there are sometimes found, as at Ehringsdorf, near Weimar, flake industries judged typologically to be Mousterian, associated with a warm fauna including *Elephas antiquus* and *Rhinoceros Merckii—i.e.*, our Chelleo-Acheulian fauna. And the same kind of thing has been observed in the caves of Menton. We might repeat what we have said about the Clacton deposit. Moreover, the shapes of the Mousterian single-sided point and side-scraper (*ulu*) are so simple and so sensible that they were made locally in many periods. These *mousterioliths*—to use Sarasin's term—are sometimes found in the latest stone periods.

All this goes to show how much care is needed in dealing with typology. The desire to find distinctive criteria results in unwarranted simplifications, from which is formed an 'armchair' science whose conclusions are both complicated and uncertain. The study of ethnographical facts gives a very different notion of what actually took place.

Upper Palæolithic. The Upper Palæolithic, though susceptible of easy subdivision—at all events on a regional basis—forms from every point of view a distinct and important unit. It is chronologically a period distin-

guished by the existence in our part of the world of the reindeer, which at length becomes so abundant as to be almost the only product, so that its old name, as already mentioned, was the *Reindeer Age*. It shows a development of art that is astonishing as much for the quality as for the quantity of its manifestations. From the industrial point of view it is marked by the development of the bone industry and by certain main characteristics of the stone industry, viz., blade industries with abundance of two principal implements—scrapers and gravers.

To come to details, the abundance of deposits inside caves where stratigraphical observations can be carried out has made it possible to establish and multiply subdivisions. But as discoveries increase the question appears more complicated. Here again the conception of development towards perfection, proceeding gradually in one direction, is shown to be incorrect.

At the beginning—about 1860—Lartet distinguished an *Aurignac* level with a fauna that included the great bear and the mammoth, followed by less important levels or varieties which he named after *Laugerie-Haute*, or *Solutré*, and *La Madeleine*, or *Laugerie-Basse*. De Mortillet at first adopted this classification, but modified it later under the influence of technological considerations: the Solutrean period, indeed, with a somewhat reduced bone industry and a stone one that included double-sided leaf implements, seemed the most suitable to make the connexion with the Lower and Middle Palæolithic industries, and it also seemed very poor in works of art. On the other hand, the Aurignac and La Madeleine industries had a common feature in the development of art and of bone industry, as well as the absence of double-sides in the stone one. Eventually, therefore, de Mortillet placed the Aurignac industry between those of Solutré and La

Madeleine, and then even disregarded it as an independent level. The Abbé Breuil, following Cartailhac and relying on fairly numerous stratigraphical facts, re-established the order of the levels thus: *Aurignacian*, *Solutrean*, *Magdalenian*, giving the following classification, starting with the lowest.

(*A*) **Aurignacian**, subdivided into three:

(1) *Lower Aurignacian:* (*a*) *Abri Audi level.* In this deposit at Les Eyzies (Dordogne) is found an industry very similar to a local Mousterian one, with a few small double-sides, ogival points, and side-scrapers, but also some special forms called *Abri Audi points.* These are distinguished by their shape, as they generally have curved backs, and by their mode of manufacture with short and steep single-sided retouches, most frequently applied only to the convex back of the point (*battered-back*).

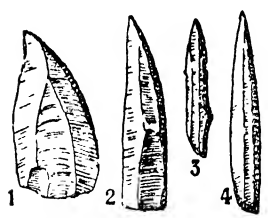

FIG. 17. BATTERED-BACK BLADES

1, Abri Audi type.
2, Châtelperron type.
3, 4, La Gravette type.

(*b*) *Châtelperron* (Allier) *level.* This industry comprises *Châtelperron points*, similar to those of Abri Audi but narrower because cut from blades (*battered-back* and *obliquely truncated* blades). The implements as a whole —blades, scrapers, and gravers—bear definite characteristics of the Upper Palæolithic. The bone industry is fairly well developed and includes what are called 'assagai points,' pins, spatulas, etc.

(2) *Middle* (or *Standard*) *Aurignacian.* This level, with very rich and numerous deposits, has sometimes been subdivided into two or three. Its most characteristic features are, in the stone industry, large blades with fairly

wide marginal retouches, some of them hollowed on two sides either by repeated touching up or to make concave end-scrapers, the result being a waist-like appearance (*strangulated spokeshaves*); and *keeled* (sometimes called *Tarté*) scrapers, some of which resemble small cores (*core-shaped* scrapers), and whose shapes range from the *mule's foot* to the *snout* and the *pick*. Besides these there are end-scrapers and gravers on blades in great variety: the *bec-de-flûte* graver, the *angled* graver, the *retouched truncated* graver, and the *busked* graver. These latter appear to take the place, in the second or Cro-Magnon phase, of the keeled scrapers which abound in the first or Aurignac phase, and are practically equivalent to them.

In the bone industry the characteristic piece, unfortunately rare, is the *Aurignac point*, or point with split base, in which the flattened base has been prepared for the insertion of a bevelled shaft. The splitting seems to have been done by making two slightly converging clefts near to each other, and then removing the tongue of bone thus formed between them. The general shape is often that of a slender triangle joined to a trapeze.

(3) *Upper Aurignacian.* The characteristic features of this level are *battered-back blades* and bladelets called *La Gravette points*—similar to Châtelperron points but more slender, with steeper and more complete dorsal retouching —and what are called *de Noailles* gravers, small in size, made by cutting off the angles of thin bladelets. Many core implements of varying sizes take the place of the keeled end-scrapers. The ordinary basis of the tool-equipment is formed by blades, scrapers, and gravers.

Shouldered points and *tanged* points are also characteristic —though somewhat rare—features. The shouldered point, made from a battered-back bladelet notched at the side near the base, is called *atypic*, in relation to similar

pieces made rather differently and found in the Upper Solutrean of South-west France. The tanged or *pedunculate* points (the tang being a long, thin stem) are named from *Font-Robert*, a bed near Brive where they abound. These tanged points, associated with somewhat thick, small, and badly-formed 'leaves,' called *Proto-Solutrean*, and with abundant microlithic forms, mark the last phase of the Upper Aurignacian.

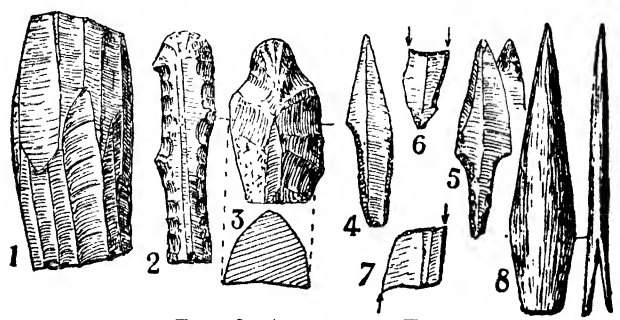

FIG. 18. AURIGNACIAN TYPES

1, double-based core; 2, 'strangulated' blade with marginal retouches; 3, keeled scraper, 'snout' type; 4, 'atypic' shouldered point; 5, 'Font-Robert' tanged point; 6, 7, 'De Noailles' gravers; 8, Bone point with split base, Aurignac type.

(*A'*) **Perigordian.** D. Peyrony, noticing quite rightly the relatively great differences between 'Standard' and Upper Aurignacian, and the resemblances between the former and the Châtelperron type of Lower Aurignacian, and making use of discoveries of mixed industries and intercalary levels, inferred the existence in South-west France of two distinct and contemporaneous industries, namely, the Aurignacian and another that he named *Perigordian*, characterized particularly by the method of steep retouches. The Châtelperron level would thus be Perigordian I, the La Gravette points would belong to Perigordian IV, and the tanged points, foliaceous

points, and *de Noailles* gravers would be placed in Perigordian V.

(*B*) **Solutrean.** The name chosen for this type comes from Solutré (Saône-et-Loire) where the first excavations took place (Arcelin and Ferry, 1866), but the varieties and subdivisions were observed later in South-west France. The basis of the stone industry consists always of blades, scrapers, and gravers. The characteristic features, which are also fairly abundant, are *leaves* worked on one side or on both.

Three phases of Solutrean are distinguished, at least locally in South-west France. In the earliest the stone industry, which is somewhat mediocre, includes single-sided leaves called *smooth-faced points*, in which the retouching is rather scanty and incomplete, but skilful. At the middle level developed the manufacture of double-sided leaves completely retouched, some of which are masterpieces of clever craftsmanship. The method of cutting is peculiar and consists in the removal of wide, thin splinters. The pieces are often very flat and are known by the old name of *laurel-leaves* (see Fig. 10, No. 2). Some of them are upwards of eight and even twelve inches in length, while others are scarcely an inch and a half or two inches, which shows the diversity of their uses despite the similarity of shape. In the latest period we find single-sided leaves with smooth faces, of elongated form, called *willow-leaves*, often made by a very skilful retouching which removed narrow, parallel splinters. This mode of cutting by parallel retouches is sometimes called *gouging*, from its resemblance to the appearance of gouged work in wood or soft stone. Another typical form is the *shouldered* point (see Fig. 10, No. 3), produced from the willow-leaf by making a lateral notch in the base. It is in relation to these that the term *atypic* is applied

to similar pieces, made rather differently and met with in other levels (Aurignacian and Magdalenian).

The bone industry seems to have been completely abandoned in the lowest Solutrean level, but it was resumed later with a somewhat mediocre development of simple forms—awls, spatulas, etc. But the interesting appearance of the eyed needle is worth noting.

(*C*) **Magdalenian.** The Magdalenian stone industry has often been regarded as a decadent one compared with that of the preceding period. Its striking feature, indeed, is the absence of pieces of very choice or really beautiful workmanship. But from the utilitarian standpoint it is very abundant and very varied. Blades, scrapers, gravers, and borers are plentiful, as in the other levels of the Upper Palæolithic. Besides this it includes a great development of the industry of small bladelets and pieces made by steep retouches, such as points and so forth. There are also very large pieces—cores made into planes and picks, large double-sided cutting-edges called *choppers*, and so forth. And it includes sporadically almost all the forms met with in the preceding levels—shouldered points, tanged points, *de Noailles* gravers, and so forth. As a characteristic individual feature the *parrot-beak* graver must be mentioned. This implement is cut from a wide, flat blade; its back has been 'battered' by perpendicular retouches into a very curved form; the opposite edge has received a notch similarly made and with one of its edges convex—the other having been removed by a right-angled blow starting at the extremity of the battered back. The result is a very peculiar implement resembling some that are mounted in modern machine tools. It is a 'good fossil' but unfortunately rare, and insufficiently trained investigators often confuse it with an oblique point or even a simple flake showing a similar profile.

If the Magdalenian flint industry is highly developed from the utilitarian standpoint it seems none the less that the greatest attention was given to the bone industry, which reached its highest development in this period. We find awls, spatulas, etc., of a simple type; eyed needles,

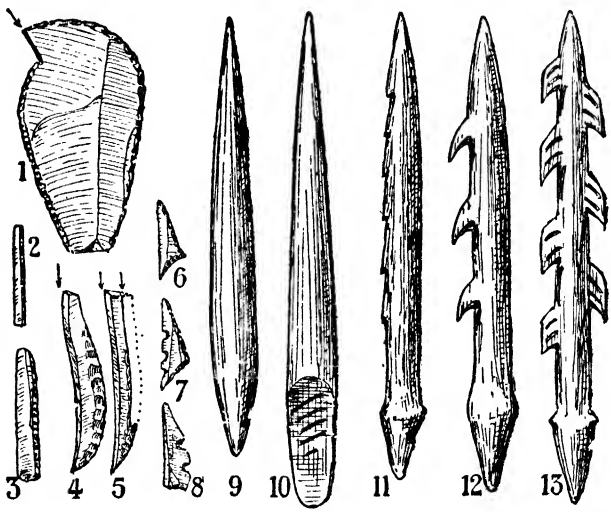

FIG. 19. MAGDALENIAN TYPES

1, parrot-beak graver; 2, 3, battered-back bladelets; 4, 5, bladelets detached from blade edges by right-angled blows (secondary product); 6, scalene triangle; 7, 8, ditto, notched; 9, round assagai point (in reindeer-antler); 10, ditto, with bevelled base; 11, 'prototype' of barbed harpoon; 12, harpoon with one row of barbs; 13, ditto with two rows.

often of ivory, of marvellous fineness; decorated pieces to be dealt with when we come to the subject of art; and lastly and above all various weapon-points usually divided into *harpoons* and *assagai-points*, though they may have served in reality for a whole series of purposes, including that of arrows and fishing-spears. As the harpoon and assagai points show very marked variations in shape it is

chiefly by reference to them that attempts have been made to establish typological subdivisions of the Magdalenian industry. The Abbé Breuil distinguishes six levels. In the first are found large round assagais with conical or bevelled bases and oval ones with bases cut in one or two bevels. Then appear the early harpoon types, which develop in the upper levels into harpoons, first with a single row of barbs and finally with two rows. The agreement of this morphological development with the chronological sequence, however, is not fully established, and several of these types, of different degrees of perfection, are sometimes found together in the same level.

A kind of rod of reindeer-antler, often ornamented and having a hook at one end (Fig. 20, No. 1), has been identified as a *throwing-stick* from its resemblance to the implements employed nowadays by primitive peoples to hurl their spears—Eskimos, Papuans, Australian aborigines, etc.

The name *bâtons-de-commandement* is given to certain mysterious objects consisting of a fairly long piece of reindeer-antler with the stump of one of the tines, or sometimes several of them, remaining, and perforated with one or more holes. These articles, which may have been some kind of accoutrement (fastenings for fur garments, for instance), were often ornamented with engravings (Fig. 20).

Upper Palæolithic Art. While the Lower and Middle Palæolithic levels have yielded no works of plastic art, finds of this kind are very numerous in the Upper Palæolithic. They can be divided into two great groups, viz., sculptures or engravings on small pieces of bone or stone, met with in early habitational deposits, and sculptures, engravings, and paintings preserved on the walls of certain caves. This 'wall' art can hardly be dated except

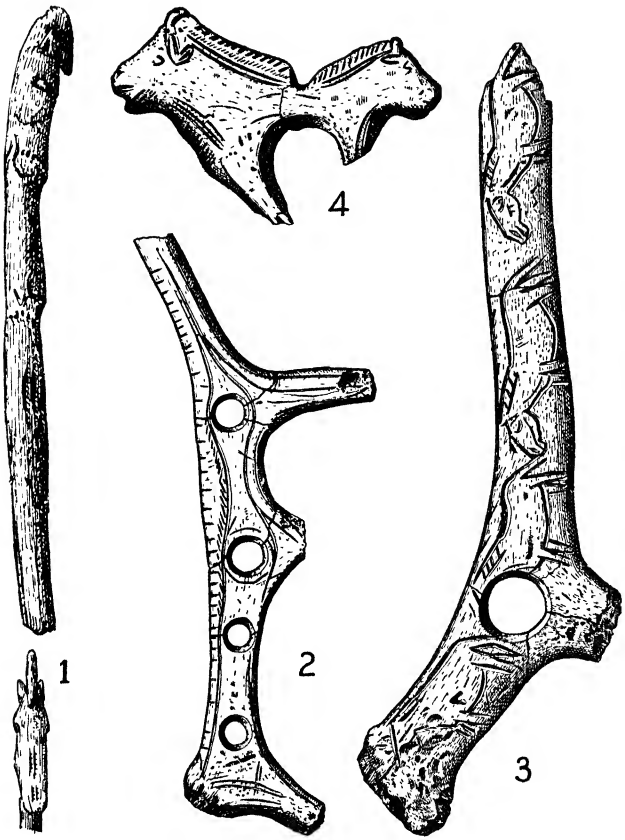

FIG. 20. MAGDALENIAN TYPES

1, hooked throwing-stick (Bruniquel); 2, 3, *bâtons-de-commandement* in engraved reindeer-antler (La Madeleine); 4, head of similar piece, carved with two protomas of *bovidæ* (Laugerie-Basse).
(Scale 1 : 3.)

by comparison with that of small objects found in position stratigraphically. Sometimes also a wall picture is partly covered by a bed whose date is known, thus showing that the former is of earlier date.

The question of authenticity that was raised in a general way by some scholars at the time of the first discoveries is no longer raised now. Many concordant discoveries, material proofs like the superficial weathering of the bone or stone, concretions, the flow of stalactites partly covering certain pictures or engravings—all these things are unimpeachable evidence. But the exceptional interest that attaches to these early artistic manifestations is an incentive to fraud, so we are compelled constantly to verify the marks of authenticity. The best are those of a material kind just mentioned. Arguments drawn from the art itself have a subjective side of such importance that they are always discussed with as much heat as their authors devote to proclaiming that they are indisputable.

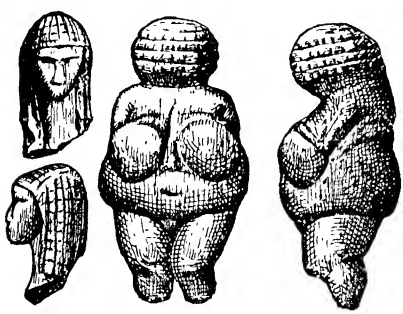

FIG. 21. AURIGNACIAN STATUETTES

Left: Hooded head, from cave of Brassempouy (Landes). *Right:* The Venus of Willendorf (Austria).

The earliest works of art appear in the Aurignacian period, and are principally statuettes of exuberantly-shaped women. In this connexion some authors have endeavoured to identify more or less completely the Aurignacian peoples with the present-day Bushmen, among whom steatopygia is a racial characteristic. But the æsthetic cult of the fat woman is widespread among many primitive peoples, and the steatopygia of the Bushmen—a much localized deposit of fat—does not appear in all the Aurignacian statuettes.

Other representations of men and animals take the

form of deep-cut engravings in stone, a kind of champlevé work or bas-relief, and paintings, or rather drawings outlined in heavy black or red lines.

The Solutrean period was long thought to be characterized by a decay of art, but a few years ago Dr Henri

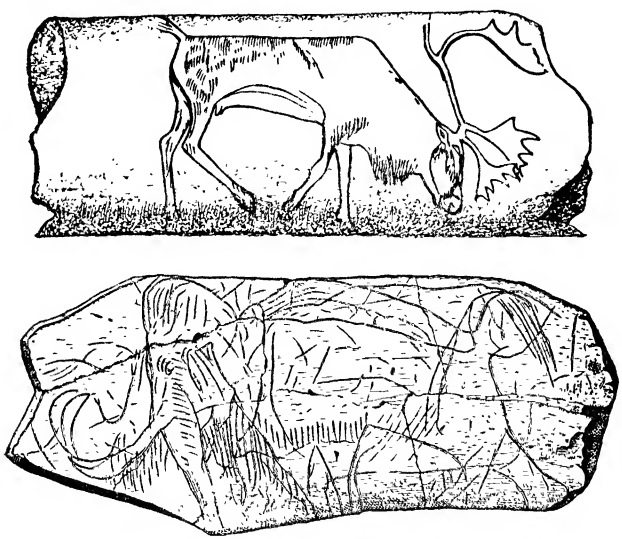

FIG. 22. MAGDALENIAN ENGRAVINGS ON BONE AND SIMILAR MATERIAL

Above: Reindeer grazing (reindeer-antler) from Thayngen cave (Switzerland). *Below:* Mammoth (ivory) from La Madeleine (Dordogne).

Martin discovered in some hearths of this period at Roc, in Charente, a series of boulders covered with bas-reliefs, mainly depicting animals (bisons, etc.), which are among the best specimens of Quaternary art.

In the Magdalenian period the highest point of perfection and abundance is reached in works of art, whether it be engravings and wall paintings or small objects carved

in the round or in the form of cut-out plaques. Yet there is an almost complete absence of human figures, and especially the human face. The realistic and vigorous style of the animal forms has been the object of much laudatory writing and speech.

The technique of the paintings has been studied particularly by the Abbé Breuil. It seems to have started with outline sketches, then developed into sketches with monochrome shading (black, red, or yellow) like stump drawing, and finally into polychrome painting in which the shading effects are touched up by scraping and fine engraved lines representing parts of the fur, etc. This increasing perfection of technique, however, does not always mean improvement in the power of expression. Magnificent examples of these two types of art are, of the first kind, the cave of Niaux (Ariège), and, of the second, that of Altamira, near Santander (Spain).

FIG. 23. WALL PAINTING IN THE NIAUX CAVE (ARIÈGE)

Bison and arrows—perhaps for sympathetic magic (Cartailhac and Breuil).

Attempts have often been made to approach the question of the origin of art by reference to documents found in Upper Palæolithic beds. It is true that these are the earliest known manifestations of art, but it is an art already highly developed, and certainly far removed from its origin. To us it appears probable that it had a double purpose, one magical, and therefore utilitarian, and the other æsthetic. But this does not warrant any definite conclusion as to the first motives and the first

practice of art. On this point we can only conjecture (see p. 30).

The Mesolithic. The Question of the Hiatus. When prehistoric study began in France investigators were struck by the following facts. A number of Upper Palæolithic deposits were found containing implements and works of art which, despite their differences, form a homogeneous unit, extensive and well marked. Above this level is another industrial unit, still more extensive and also well marked in spite of many variations and varieties—viz., the Neolithic. Now everything that seems important and most characteristic in the implements, weapons, and art of the Palæolithic has entirely disappeared in the Neolithic, whose principal features are types that came all unheralded. One of the striking features of this contrast is the total disappearance of the beautiful and realistic animal art. This has given rise to the idea of a gap or *hiatus* between Upper Palæolithic and Neolithic, and many hypotheses have been advanced to explain it.

The school of Gabriel de Mortillet assumed that the reindeer-hunters had migrated in pursuit of their life-giving fauna and that the country was peopled anew by invaders from the Caucasus or India. But this hypothesis will not stand criticism, for a gradual mitigation of climate replacing the reindeer by other *cervidæ* and adding to the resources of the flora and fauna does not really justify a general migration. The facts themselves, so far as they can be discovered, contradict it. In Neolithic burial grounds, especially at Beaumes-Chaudes in France and at Chamblandes in Switzerland, have been found remains of individuals akin to the Quaternary races—and to the Cro-Magnon race in particular. Various discoveries have, in fact, brought to light deposits of the

post-Magdalenian period and of an industry that is pre-Neolithic, or at least not Neolithic. And so, it seemed, the gap first observed was filled. There was no longer any hiatus, and this intermediate period has been called *Mesolithic*.

Azilian. In the great cavern of Mas d'Azil (Ariège) Piette discovered in 1887–89, above the Magdalenian beds with their bone engravings and below a deposit containing Neolithic debris, a level characterized by its own fauna and its own special industry, to which he gave the name *Azilian*. The fauna no longer includes the reindeer, but the red deer and beaver are abundant. The stone industry includes mainly small pieces of two principal kinds: battered-back bladelets often of the 'penknife blade' type, and small round scrapers. The bone and horn industry includes in particular harpoons of deer antler of a peculiar type—flat, rather short, with perforated base and asymmetric barbs. And we note also the disappearance of figured art and the appearance of new objects—small pebbles marked with patches and lines of ochre. These have been compared to the Australian *churingas*—stones with which animist ideas were associated—and to similar pieces found near the temple of the sun at Teotihuacan, in Mexico.

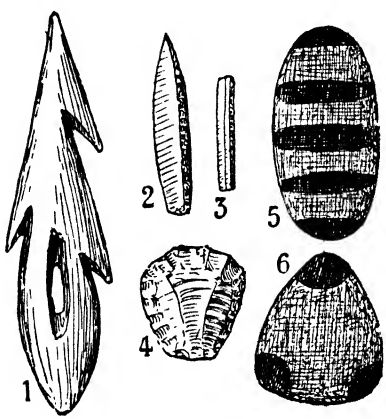

FIG. 24. AZILIAN INDUSTRY

1, flat harpoon of deer-antler; 2, 'penknife blade' point; 3, battered-back bladelet; 4, (short) scraper; 5, 6, painted pebbles.

Tardenoisian. This name was given by de Mortillet to an industry discovered since 1879 at several places in the region of Fère-en-Tardenois (Aisne) by Vielle and Taté. The principal characteristic of this industry is the inclusion of small flints or microliths made from bladelets and carefully cut in geometric forms, such as triangles, trapezes, segments of circles, and so forth. There is also that somewhat peculiar drill-shaped implement called a *micro-graver*. Unfortunately the finds have generally been made on the surface, or not deep enough to show any stratification, and in sandy soils where faunal remains have not been preserved.

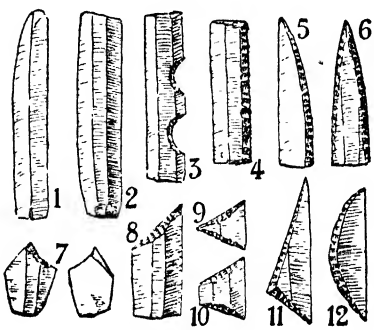

FIG. 25. TARDENOISIAN INDUSTRY

1, 2, blades; 3, ditto, notched; 4, ditto with battered back; 5, battered-back point; 6, point with battered edges; 7, micro-graver; 8, obliquely truncated blade; 9, triangle; 10, trapeze; 11, scalene triangle; 12, segment of circle.

At certain spots—*e.g.*, in the islands of Téviec and Hoëdic, so well excavated by M. and Mme St-Just Péquart—a Tardenoisian industry has been found without any of the characteristic Neolithic features. But many other beds in the Paris basin, the Rhône valley, etc., show Tardenoisian implements in association with typically Neolithic elements, such as pottery, polished stones, and arrowheads of peculiar shapes. The conclusion is therefore reached that the Tardenoisian phase lasted a long time and might be subdivided into several stages—four, according to Capitan—of which the last, at all events, is Neolithic, and very advanced Neolithic at that.

To M. Coulonges we owe the discovery at Sauveterre-

la-Lémance of two deposits where he was able to make stratigraphical observations. Above a Magdalenian level Coulonges found a bed of microlithic industry comprising bladelets made into points, plenty of triangles, segments of circles, small *tranchets*, micro-gravers, etc., but no trapezes. Above this came three other levels with abundance of blades, sometimes obliquely truncated, trapezes, and so forth. The last of these levels contained winged arrow-heads and decorated pottery akin to that of the latest Neolithic and the beginning of the Bronze Age in South-east France and Switzerland. Coulonges gives the name *Sauveterrian* to the first level above the Magdalenian, marked by the abundance of small triangles and the absence of trapezes.

Maglemosian. In Northern Europe, covered by the glacier and uninhabitable till the end of the Reindeer Age in Western Europe, it has been possible to follow better than elsewhere the changes in climate and human industry since the return of these regions to life. To the earliest phase, characterized by a flora of birches and aspens, belong the abodes of hunters who had domesticated the dog. The industry comprises many bone and horn pieces, such as awls, fish-hooks, chisels, and harpoons with one row of barbs, whence the name *Ben Alter* (Bone Age). The flints are cut into fairly regular blades, elongated scrapers, *tranchets*, and large points or picks. There are also some microliths, triangles, trapezes, and truncated bladelets. Some bone points, called harpoons, have a row of flint bladelets, placed end to end, embedded in two lateral grooves. In the specimens known to us they are simple bladelets and not geometrical microliths. The name *Maglemosian*, from Maglemose, the 'great moss' or marsh of Mullerup in Zealand, has been given to this industry, the resemblances of which to the Azilian are

far less numerous than the differences, though its chronological position seems to agree fairly well.

Before drawing any general conclusions about the Mesolithic or transitional period it will be as well to examine the Neolithic that followed it.

The Neolithic. This term was chosen to indicate that the period was one whose stone industry was entirely different from that of preceding ones. But if the polishing —or, more accurately, the grinding—of stone is a new method it does not involve the disappearance of the flaking method, which even remained the ordinary procedure for the majority of implements. What is noticeable, on the other hand, is the existence of domestic animals and cultivated plants, both cereal and textile. And accompanying all this progress we find also the creation of fairly important human groupings—actual villages—as well as co-operative labour, including sometimes the erection of enormous stone monuments called *megaliths*.

FIG. 26
MAGLEMOSIAN INDUSTRY
Left: Compound type with flint bladelets set in grooves. *Right:* Simple type.

All this in our countries of Western Europe makes a very characteristic and very impressive whole, because of the contrast it presents to the Palæolithic. It must be remembered, too, that the fauna and flora were also changed, and point to a climate resembling our own.

(*A*) **Lake-dwelling Neolithic.** We have exceptional information at our disposal concerning this period in the region of the Western Alps. On the edges of many lakes in Switzerland, Northern Italy, and France have been

found the remains of lake-dwellings, villages built on piles, which must have been very similar to those known in various regions to-day, especially in New Guinea. The rubbish and other things that fell accidentally into the water have been preserved in the mud or peat at the bottom, so that it has been possible to recover not only

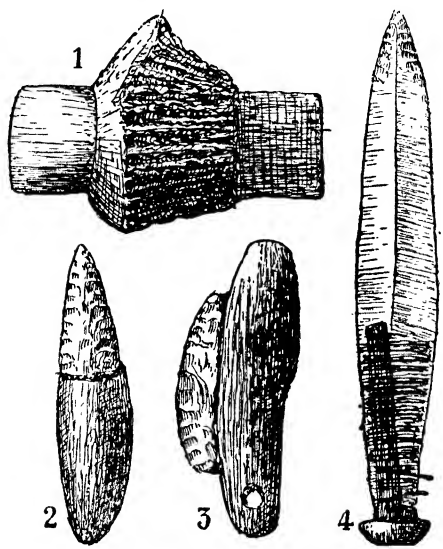

FIG. 27. NEOLITHIC LAKE-DWELLING INDUSTRY

1, axe in socket of deer-antler; 2, pointed knife with handle at base; 3, knife with handle at back (*ulu* type); 4, dagger.

the stone industry and bones and pottery but also wooden implements, handles, fragments of woven fabrics, grain, fruit, and so forth. The fires that so often destroyed these villages have rendered valuable assistance to archæology by causing all these things to fall into the water—personal objects and partly carbonized provisions. Through these documents it is possible to reconstruct in many of its details the life of the lake-dwellers.

Those who did not live over the water have left their mark in caves, or most frequently on the surface of the soil, sometimes in places organized for defence. Such of their industry as has been discovered is similar or analogous to what is known of the lake-villages. So de Mortillet selected "as characteristic of the polished stone period" one of the richest lake-dwelling areas, viz., Robenhausen, on lake Pfäffikon, near Zurich, and hence comes the term *Robenhausian.*

M. Paul Vouga has recently been able to establish a chronological classification of the Robenhausian phase of the Swiss lakes. He distinguishes an *early* and a *late* period, the latter comprising Middle Neolithic, Late Neolithic, and *Aeneolithic.* This last term has long been used in Italy to denote the transitional phase when stone and bronze (*aeneus*) were in use together. But there is a very considerable body of industries and customs common to all these periods, and the possibility of distinguishing between them rests only on secondary points, such as the shape of axe-sheaths, objects of adornment, details of ornamentation, and the shapes of pottery. This lake-dwelling Neolithic forms a homogeneous unit—a civilization which, once established, developed slightly on the spot. Here we can describe only its main outlines.

The importance of the organization from the social standpoint is attested by the grouping of the people in villages and the work performed co-operatively, *e.g.*, causeways and bridges of great length connecting the villages with the shore. Much attention was still given in everyday life to fishing and hunting the deer, wild ox, boar, etc., but even in the earliest lake-villages are found the five domesticated animals—dog, ox, goat, sheep, and pig. The horse seems to be associated only with the latest sites. The flora has been very fully studied, and about

two hundred species have been identified. As regards foodstuffs, apples, pears, nuts, and acorns were preserved as provisions, and the grape has been found in several places. A kind of bread or biscuit was made from cereals, and three varieties of wheat have been identified, besides two kinds of barley and two of millet. The principal textile plant was the narrow-leaved variety of flax.

Weapons and implements were made of wood, bone, and stone. Maces and bows were of wood. Bone was used for daggers (often made from the leg-bone of an ox), chisels, and points of all kinds whose purpose is often difficult to determine. It can be said, however, that some were the heads of arrows or assagais, others were used as punches or awls, while others again were fastened together to make carding-combs, and so forth. The antlers of the deer and elk were much in use for making flat harpoons like those of Mas d'Azil, as well as hammers and axes and picks often perforated with eyes like our modern tools. Wood and bone were also used to make handles for stone implements.

Among these latter the most characteristic on account of their novelty are the polished stones, made from tough rocks, called collectively 'axes,' and comprising axes, adzes, and chisels. Knives of various shapes were made from flint flakes, sometimes uncut, sometimes retouched on one or both sides, sometimes used singly, and sometimes several being joined together and mounted in line in a wooden handle, fastened with mastic. So we have plain knives, daggers, household knives of the *ulu* type (often wrongly called 'saws'), sickles, and so forth. Scrapers and a few rare gravers like those of the Upper Palæolithic remained in use. And, lastly, a great variety of very skilfully worked arrow-heads are among the best products of the flint industry.

Among those remains which reveal the methods and manner of life of the lake-dwellers must be mentioned numerous millstones, either flat or slightly hollowed, accompanied by hand-crushers to crush the grain, and a complete little spinning and weaving outfit, including spindle-whorls, carding-combs, weights for stretching the warp, loom rods, and so forth.

What might be called the table-service included wooden bowls (with looped or straight handles) and much pottery, the latter of various forms arranged in two main groups: (*a*) those of flat shape, including dishes (somewhat rare) and particularly round-bottomed basins or bowls; and (*b*) those of upright and flat-bottomed form, sometimes like a flower-pot and sometimes of truncated egg shape. (A tulip or cup type, like the vessels called caliciform or bell-shaped—*Glockenbecher*—is found in the Rhineland near Switzerland, but not, as has often been alleged, in the lake-dwellings.) It should be noted that pottery of the same period includes specimens of very different quality. Linen cloths of ordinary type and somewhat coarse and loosely woven fabrics were used for clothing. Nothing can be said about skins, for these have not been preserved. Articles of adornment, such as combs, buttons, pendants, etc., made of bone or horn, are very plentiful.

Naturalistic art, as we have said already, entirely disappeared. But the eastern lake-dwelling area (Austria) contains crude images of baked clay. Representations of horns and crescents in clay—undoubtedly religious symbols—and the decoration of some of the pottery and bone pendants are almost the sole forms of art. They are confined to strokes, chevrons, and dots—a fairly simple geometrical kind of ornament. But most frequently the only ornament on the vessels consists of small nipples, some of which serve as handles, or a rope

of clay applied near the edge and arranged in festoons by pinching with the fingers.

(*B*) **Nordic Neolithic.** Scandinavia (and the adjoining German zone) formed a remarkably homogeneous prehistoric area. Material and intellectual considerations alike have enabled it to be studied with particular thoroughness: finds are plentiful, stratigraphy and the study of flora are often possible owing to the frequence of peaty or clayey deposits, and there is less risk of the mixture of industries because there are no glacial or preglacial ones. From the intellectual standpoint good archæologists have been forthcoming because of the high cultural level of these countries, the tranquillity that results from security, and the sense of method that prevails. These investigators, too, have not been drawn away from the study of primitive civilizations by the lure of more brilliant ones, as happens in the lands of classical antiquity.

We shall confine ourselves here to pointing out some of their results of wider range than the country itself. Near the sea-coasts have been found considerable deposits resulting from human occupation. They consist chiefly of the shells of edible molluscs in association with various kinds of debris, such as bones, worked stones, traces of hearths, and so forth. Scandinavian archæologists have sometimes called them *kjökkenmöddinger* (kitchen rubbish), or kitchen-middens, a name that has become popular in France, whereas in the country itself the term *skaldynger* (shell-mound) or *affaldsdynger* (rubbish-mound) is preferred. They correspond on the whole to a primitive fishing and hunting mode of life and are later than the Maglemosian Bone Age. The Scandinavians call this period the Old Stone Age. It is also the Age of Oak, for almost the whole of the charcoal debris is of this kind of wood. The fauna is that of to-day with the addition of

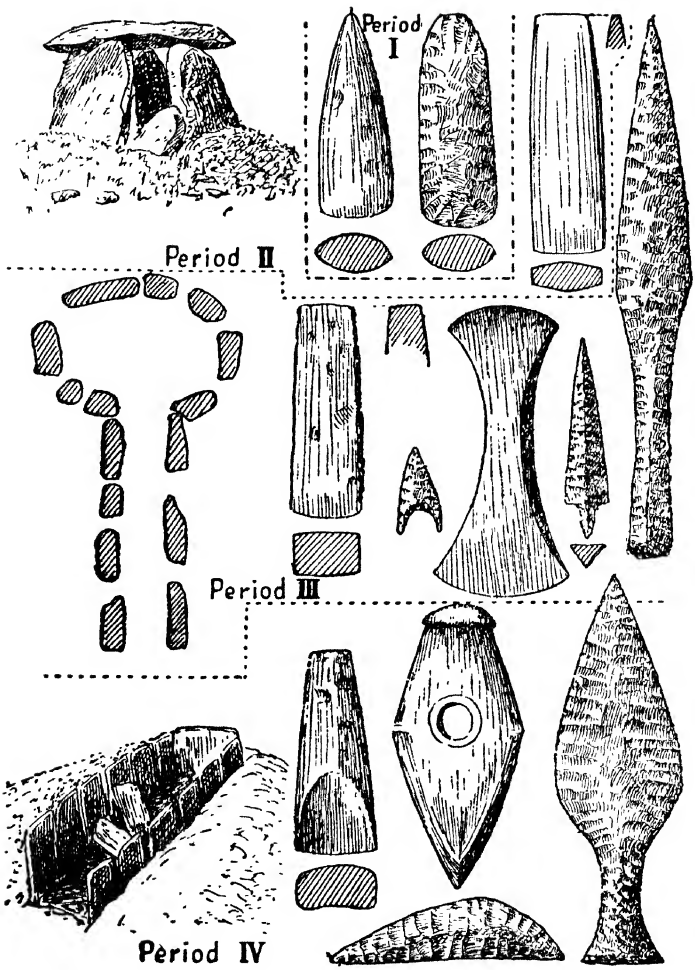

FIG. 28. NORDIC NEOLITHIC

Characteristic features of the four periods, according to Montelius

some species now exterminated, such as wood grouse, great auk, beaver, bear, elk, etc. It also includes the dog, represented by at least two species, including *Canis familiaris palustris*, already identified in the Swiss lake-villages by Rutimeyer, and apparently related to a primitive type of jackal or wild dog. The stone industry comprises chiefly *tranchets* (shell-mound axes) in very varying sizes, picks or axes with a very narrow cutting-edge, elongated blades, scrapers, and borers. Bone and horn objects are fairly plentiful and include awls and daggers, axes or picks with perforated eyes, and fish-hooks. The pottery is coarse, one type having a pointed base and another almost cylindrical.

This Shell-mound or Kitchen-midden phase was succeeded by what the Scandinavians, with Montelius, call the Second or Young Stone Age. In this they distinguish four periods, according to the kind of burial and sundry details in the developing industry, as follows:

(1) Period of graves dug in the soil, and 'round axes' —*i.e.*, axes with rounded section.

(2) Period of *dolmens* and flint axes with thin butt. Dolmens (a Breton word for 'stone tables') are megalithic monuments formed by large rough stones, the simplest type having three elements—viz., two upright supports with a horizontal cap-stone on top, but there are often five or six supports and two or three cap-stones.

(3) Period of *passage-graves*, also called *covered ways* or *passage dolmens*. These are a lengthened form of the preceding. Personal effects include flint axes with thick butt, boat-shaped axes with haft-holes, flint daggers and spears, etc. Axes of copper, either fine or slightly alloyed, make their appearance.

(4) Period of *cists* or stone chests. Here the funerary monuments are no longer megalithic, but reduced to

coffers of upright slabs either uncovered or covered with horizontal ones. Axes with thick butts, very fine daggers and arrows, sickles or crescent-shaped knives, etc., form an important body of stone material, with which are associated a few daggers and axes of copper or bronze.

The periods that followed, in which the use of metal gradually developed without any other change, are regarded as forming the Bronze Age, a proto-historic period which can be approximately dated by reference to the relations of the Nordic area with the Near East: it corresponds roughly to the second millennium B.C.

(*C*) **French Neolithic.** The abundance of Neolithic remains in France bears witness to the fact that that country was very populous during this period. But these remains are far from being homogeneous. We are compelled to recognize very different industries, despite the main features that they have in common, viz., the presence of pottery and polished stone. To begin with we can distinguish two great regions, one in the north and west, from Flanders to Aquitaine, and the other in the south-east. In the first there abounds an industry akin to that of the Scandinavian shell-mounds, with *tranchets* (shell-mound axes), picks, scrapers, blades, etc., to which has been given the name *Campignian*, from Le Campigny (Seine-Inférieure). This 'pure' industry would include coarse pottery but no polished axes or even chipped ones. It would represent the Early Neolithic phase. But it is found chiefly in the 'impure' state—*i.e.*, in the shape of an industry comprising implements somewhat coarsely chipped, of more or less cylindrical or prismatic shape, among which are found, besides *tranchets* and picks, axes and adzes with more or less wide cutting-edges and sometimes slightly polished. Between these two types there are all the intermediate ones, as well as flint axes wholly polished,

such as are met with in very highly developed Neolithic graves. We even find coarse *tranchets* cut from pieces of fine polished flint axes. Thus the Campignian industry, with more or less important variations or additions, seems to have lasted in some parts of France till the end of the Stone Age. The same thing had been seen in the case of the Tardenoisian microlithic industry. The south-eastern archæological region is clearly connected with that of the Swiss lake-dwellings. In particular there are the same little polished axes of tough rock and the entire absence of polished flint axes, and the arrow-heads, pottery, etc., are also similar in every way.

But apart from these industries resembling those in lands where it has been more possible to study them, France also includes in its Neolithic stock, in the north-west as well as in the south-east, some very marked variations. "*Facies*," you will say, and quite rightly. But sometimes these different facies or varieties are met with in a single small area, yet there is no doubt that they were not contemporaneous. What was their chronological order? There are no data to determine it, stratigraphical or otherwise, and for this reason it has been possible to describe the latest Stone Age period as the least known. We get glimpses of a medley of more or less particularist tribes, influencing each other by their trading or war-making relations. Some Palæolithic survivals were a long time being absorbed. The question is a very complex one and too inadequately understood to be set forth here in summary form.

More than four thousand dolmenic erections of the types mentioned in connexion with Scandinavia have been counted in France, scattered over almost the whole of the country. They are particularly abundant in Brittany and Languedoc. The industry differs slightly

from that of the north, but it is none the less of a very similar level: in both regions metal (copper or bronze) is beginning to be intermingled with the very well-worked stone.

This same industry—except for local variations—and also the same methods of burial are found in graves of very different construction but similar in size and internal appearance. The difference seems to arise from the nature of the local materials, *i.e.*, from the geological constitution of the soil. Sometimes there are natural caves which have been utilized, as in Provence; sometimes artificial ones have been dug in rock formations that are soft but firm enough, as in the chalk of Champagne; sometimes the grave was made in the shelter of a large piece of rock under which a chamber was dug, the rock itself being shored up by low walls, as in Provence and the Paris Basin. The building of dolmens, very often covered with earth, served to create small artificial caves in a region where there were no natural ones, where the soil was too hard to be dug (or too soft for a hole to remain when dug), and where there were large blocks of stone at hand. First and foremost among regions of this kind are the granitic ones. Community of inspiration and mode of construction of dolmens in discontinuous areas must not lead to the conclusion that ancient culture was discontinuous: we must see whether differences in the nature of the soil do not suffice to explain differences in methods of construction.

Along with dolmenic erections appear other megaliths —*menhirs* or 'standing stones,' which are merely upright blocks. Many theories have been put forward as to the meaning of these monuments. If we can judge from the modern examples supplied by ethnography (the Khassias of India) we can only think that such monuments,

identical in material, have stood for a whole series of symbolic values, commemorative, expiatory, indicatory, and so forth, with no possibility of determining the precise meaning of each one. Groups of menhirs form *alignments* when disposed in straight lines, but they are sometimes arranged in circles.

Without discussing the exact signification of megalithic constructions two points clearly emerge: they necessitated an advanced social organization because of the enormous amount of labour involved, and they provided not for material needs but for beliefs and ideas. They can thus be regarded as a manifestation of the power of an ideal and of discipline.

By reference to finds of objects of oriental origin or influence we may place the best dolmenic period across the junction of the third and second millenniums B.C.

Early Human Races

We have very few osteological documents relating to men of the Lower Palæolithic. The principal one is the 'Mauer jaw,' found in the village of that name near Heidelberg, in sand beneath two layers of loess. The dentition is entirely human, but the very massive jaw, without a trace of chin, has a simian or bestial appearance. The species to which it belonged has been named *Homo heidelbergensis.*

The Piltdown (Sussex) discovery is also very incomplete, consisting only of the remains of a skull, a fragment of mandible with two teeth, and one separate tooth. It is less well dated as a deposit, and has given rise to some discussion. Morphologically the skull is "highly human," whereas "the mandible is, on the contrary, very simian" (Boule). It is called *Eoanthropus Dawsoni.*

ARCHÆOLOGICAL CLASSIFICATION

For Middle Palæolithic man we have good and fairly numerous documents. They belong to the race called *Neanderthal*, from the name of the first find made in a cave in the Rhineland. Other finds have been made in France and elsewhere, the most famous, perhaps, being that of La Chapelle-aux-Saints (Corrèze) made by the Abbés Bouyssonie and Bardon and studied by M. Boule, and that of La Quina (Charente) made by Dr H. Martin. The Neanderthal type shows very archaic or pithecoid characteristics, the most marked being as follows: the weak development of the cerebral part compared with the face; the existence of enormous superciliary arches joined together to form a ridge or 'vizor'; the heaviness of the jaw and the absence of a chin; the shape of the leg-bones and spinal column indicating "a less perfectly upright attitude than that of modern man."

When we come to the Upper Palæolithic, human species of lower or primitive type disappear and are replaced by others belonging to "the universal stock of modern *Homo sapiens*." Finds in France show at least three clearly defined races, viz., the *Cro-Magnon* (a cave in Dordogne), the *Chancelade* (another cave in Dordogne), and the *Grimaldi* (caves near Menton).

The *Cro-Magnon* race is characterized by a long and highly arched skull (dolichocephalic and hypsicephalic) in contrast to which the face is relatively low and wide, making a badly proportioned head. The nose is narrow and the chin prominent. The length of the bones indicates a tall figure, round about six feet. Living survivors of this race have been observed even in France, but particularly among the Guanches of the Canary Islands.

The *Chancelade* race has a very dolichocephalic and very lofty skull, with the face also very wide as well as very high, so that the head is well-proportioned.

The mastoid apophyses are highly developed and the cheek-bones strong and prominent. The figure is very short—five feet in the case of the one Chancelade specimen. Judging from these characteristics, Testut drew a parallel between this race and the Eskimos, but this is no longer accepted.

The *Grimaldi* race, represented by two not very tall specimens (62½–64 inches), shows characteristics which have caused it to be regarded as negroid (Dr Verneau) —viz., the great length of leg compared with the arms, and the general cranial features: the head is bulky and very elongated behind (hyperdolichocephalic), while the face is wide and not very high (therefore ill-proportioned). The nose is very wide and the floor of the nasal fossæ ends in two grooves as in the case of negroes. A marked prognathism, particularly alveolar, and a weak development of the chin give a receding appearance to the lower part of the face.

Without adopting any incautious conclusions we may find it interesting to note, with M. Boule, that these races "show affinities" with each of the three great divisions of the human race to-day—the white, the yellow, and the black.

The few finds that have been made of *Mesolithic* man show a mixture of races. At Ofnet (Bavaria) some thirty skulls were found together in two trenches, some dolichocephalic with a long face (well-proportioned heads unlike the Cro-Magnon ones), and some brachycephalic, these latter being the earliest known—the first invaders, it would seem—of the race *Homo alpinus*. At Mugem (Portugal) the dolichocephalic are in a large majority, but it has not been possible to connect them with any certainty either with the Cro-Magnon or with the Mediterranean race.

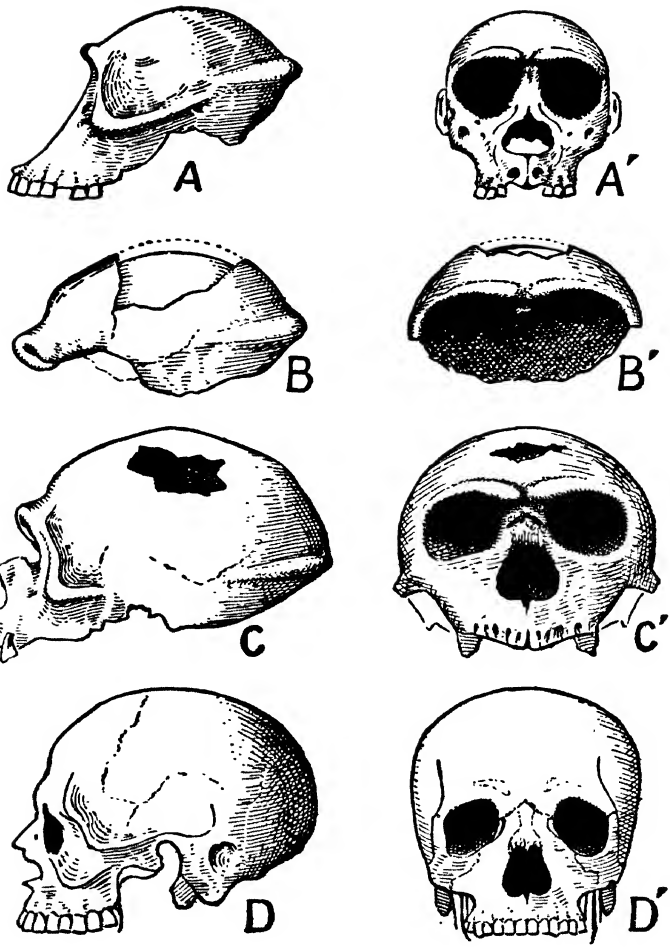

FIG. 29. COMPARISON OF THE SKULLS (FRONT AND SIDE VIEW) OF (A) ANTHROPOMORPHOUS APE (CHIMPANZEE), (B) 'SINANTHROPUS' (FROM CHOUKOUTIEN), (C) NEANDERTHAL MAN (FROM LA CHAPELLE-AUX-SAINTS), AND (D) A MODERN FRENCHMAN (Material from Boule and Black.)

In the *Neolithic* period comes the 'placing' of the three principal physical types distinguished by anthropologists in the welter of races and sub-races in modern Europe. These are the *Nordic*, the *Mediterranean*, and the *Alpine*, the latter inserted between the two former like a wedge protruding from the east.

Correlation between the Various Classifications

We have seen how a parallelism can be established between the two geological classifications based on marine and glacial phenomena respectively. Since the latter seem to have been the more completely studied and are of particular importance for the traces they have left and the influence they have exerted on the habitation of the human race, it remains to be seen what correlation can be set up between them and the archæological epochs as defined in Western Europe. This is the problem of "placing the Palæolithic." It is still a subject of debate, owing particularly to the difficulty of linking up the various glacial formations, or those derived from glacial action, with those which have served as a basis for classification. The question of industrial facies, *i.e.*, of local differences in contemporaneous industries, adds another serious difficulty. But solid conclusions can none the less be reached by starting with the Middle Palæolithic, and the chief uncertainty concerns the beginning of the Lower Palæolithic industry—that of Chelles. The matter can be summarized as in the table at the end of the chapter.

The Neolithic period passed gradually into the Bronze Age, and, since then, despite many vicissitudes, such as population movements, wars, and invasions, it would seem that, taking them all round, the human races

have remained as they were fixed to the soil by the agricultural life of the Neolithic period.

Absolute Chronology of the Quaternary Period. Attempts have been made to evaluate the age of the various periods in terms of years by reference to archæological, geological, and even astronomical facts.

The *archæological* facts that join our prehistory to the ancient history of the east have made it possible to establish that the end of the Neolithic period and the beginning of the use of metals—gold, copper, and bronze—is to be placed in the third millennium B.C., the bronze period in the second, and that of iron in the first.

The *geological* facts that have been called in to aid are of very various kinds: the erosion of valleys, the raising of sea-coasts, the formation of alluvial or peaty deposits, and so forth. But it must be assumed as a postulate that these were regular throughout the ages, whereas not only is this postulate incapable of proof, but it is even certain to be inaccurate, for the phenomena in question continued throughout periods of geological and climatic changes.

There is only one system that escapes this fundamental defect. This is the method of *varves* or *laminated deposits in annual zones*, which is due to the Swedish geologist Gerard de Geer. He seems to have shown clearly that in the final period of the last glaciation in Scandinavia the water from the melting glaciers deposited thin beds, light-coloured in summer and dark in winter. All that is necessary, then, is to count the alternations, following laterally the passage from one deposit to another. In this way the stages in the retreat of the glacier have been retraced, year by year, and it has been found that this withdrawal, at a rate of from twenty to four hundred metres a year, lasted about 5000 years from the north-east of Scania to Norrland. After making comparison with

glacial phenomena in North America, Antevs decided to place the maximum of the last glacial period between 50,000 and 30,000 years ago, while the end of the period would be about 14,000 years ago.

It has been thought that certain *cosmic* facts, such as the precession of the equinoxes, whose periodicity is known (21,000 years), were the cause of glaciations and would enable them to be dated. But it was found that the phenomena to be thus used did not seem capable of yielding such results, and also that no traces of periodical glaciations were to be found in periods earlier than the Quaternary. So these cosmic hypotheses have been entirely abandoned.

ARCHÆOLOGICAL CHRONOLOGY IN WESTERN EUROPE

EARLY PALÆOLITHIC	CHELLEAN AND ACHEULIAN, with double-sides (*bifaces*) predominating. Various flake facies predominating: *Taubach, Clacton, Lower La Micoque* (or *Tayacian*).	GEOLOGICAL DATE: Earlier than the last Würm glaciation. The beginning may be earlier than Riss or even Mindel. The principal deposits belong to the Riss-Würm interglacial period. FAUNA: 'Warm,' including *Elephas antiquus, Rhinoceros Merckii, Hippopotamus* (*major* or *amphibius*). HUMAN RACES: Mauer man (one jaw only); Piltdown man (date less certain; an incomplete skull only).
MIDDLE PALÆOLITHIC	MOUSTERIAN, with northern wide-flake facies (called *Levalloisian*).	GEOLOGICAL DATE: Period of Würm advance. FAUNA: 'Cold' or rather mixed, with *Elephas primigenius* (mammoth), *Rhinoceros tichorhinus*, horse, ox, *cervidæ* including reindeer. HUMAN RACES: Neanderthal man.
UPPER PALÆOLITHIC	AURIGNACIAN AND PERIGORDIAN SOLUTREAN MAGDALENIAN	GEOLOGICAL DATE: Period of Würm retreat and dry and cold post-Würm period. FAUNA: Increasingly cold and poor. Maximum cold and predominance of reindeer in Magdalenian period. Oxen, horses. *Steppe* fauna, and at end of period *tundra* fauna. HUMAN RACES: Races of *Homo sapiens*: Cro-Magnon, Chancelade, Grimaldi, having affinities with white, yellow, and negroid races. All dolichocephalic.
MESOLITHIC	AZILIAN TARDENOISIAN	Beginning of the present period. Climate temperate, sometimes more humid than to-day. FAUNA: Disappearance of reindeer. Stabilization of present-day species. HUMAN RACES: Juxtapositions and mixtures of various races. Arrival of brachycephalic.
NEOLITHIC	Numerous facies, insufficiently dated: TARDENOISIAN CAMPIGNIAN ROBENHAUSIAN	Present geological period. FAUNA: As to-day, except for destruction that has taken place. HUMAN RACES: Varied and mixed. Gradual increase of brachycephalic. Old dolichocephalic (Cro-Magnon) stock reabsorbed. Other dolichocephalic races (*Homo nordicus*) take root.

PART III

PRINCIPAL PREHISTORIC MATERIAL THROUGHOUT THE WORLD

CHAPTER I

AFRICA

1. EGYPT

THE special interest taken by the prehistorian in Egypt arises from the great antiquity of its historic period and the prominent part played by this country at the beginning of the Mediterranean civilization from which our own was born. The conservative attitude of the early Egyptian peoples enables us to discover in historic times many traces of prehistoric eras, and its exceptional climate has enabled multitudes of perishable objects to be preserved.

Egypt has played a peculiar part in Africa on account of its proximity to an Asiatic area resembling its own, in which great rivers flowing from a huge and distant mountain massif bring fertility to long plains ending in a marshy delta. Mesopotamia also, situated in similar physical conditions to those of Egypt, knew a similar early development of civilization. The spheres of influence of the two countries overlapped, and for several millenniums the importance of this region at the junction of two continents dominated the history of the great civilization that was being born. The beginnings of this phase belong to prehistory: the closing period of the Stone Age bore in its womb the civilization of the future, and

is on that account of unparalleled interest. In the earlier periods, when conditions were not the same, and the climate, especially the rainfall, was different, these regions had not yet become vast oases and do not seem to have played a part of any special importance.

There has been discovered in Egypt the existence of a succession of stone industries correlated with geological formations that correspond fairly closely with the divisions established in Western Europe, and we shall therefore designate them by the same terms.

Early and Middle Palæolithic. On the sides of the cliffs that flank the valley of the Nile in modern Egypt can be recognized the traces of the Quaternary river, several miles wide, which carried down and deposited thick beds of stony alluvium. The banks of gravel thus formed reach a thickness of 33 to 50 feet, and are situated above the existing thalweg at a height comparable to that of the oldest gravels containing signs of human industry in the valleys of the Somme and the Thames. And they contain a similar industry, with the same double-sides of Chellean or Acheulian type.

A series of terraces near Thebes and between Luxor and Assiut was studied by Sandford. Descending from a Pliocene plateau at a level of about 330 feet, we find at 165 feet a bed of gravel without any signs of industry, followed by a 100- to 115-foot terrace with a Chellean industry. Another terrace at about 50 feet contains pieces of fine Acheulian type (La Micoque variety), and lastly, a few yards (averaging about 15 feet) above the present water-level, there is a low terrace containing a Mousterian industry.

At the point of the delta, in the quarries of Abbasiyeh, near Cairo, the stony alluvia of the Quaternary Nile are displayed in enormous banks. Father Bovier-Lapierre

recognized the superposition of Mousterian on Chelleo-Acheulian, and observed at the base of the latter an industry of the *Chalossian* type. But we know how difficult it is to make and interpret stratigraphical observations in a single mass of alluvia. At all events he found a number of trihedral-pointed pieces of the Chalossian type, the abundance of which on one site seems to be a mark of one facies of the Lower Palæolithic (see p. 105).

Miss Caton-Thompson was able to find in the oasis of Kharga the order of succession of geological events, climates, and industries for a part of the Quaternary period. After a period of great erosion with no human traces came a phase in which the upper valleys were filled up with angular breccias without the action of water, which indicates a long dry period. On these breccias considerable formations (26 to 33 feet) of tufas bearing vegetable imprints, together with terrestrial shells of archaic and tropical types, mark a return of a rainy climate. An Acheulian industry appears here in gravels underlying these tufas, the oldest of the series called *Wadi tufas*, and it is found again at the surface in the gravels of the plateaux. At the very lowest level of the tufas there is found in places an industry consisting of double-sides and flakes of the Levallois type.

Next came the formation of a second level of Wadi tufas. In these Miss Caton-Thompson discovered ancient soils strewn with implements. They were all made from flakes cut from tortoise cores, almost like the Mousterian of Northern France. The finder calls this special variety of industry *Pre-Sebilian* (see p. 146).

This tufa formation was followed by a phase of erosion, two or three small terraces being formed. In the gravels of the upper terrace, 23 feet above the present Wadi, Miss Caton-Thompson again found her Pre-Sebilian and,

superposed on it, an *Aterian* industry (see p. 145) which has scarcely been found even in the valley of the Nile.

Upper Palæolithic and Mesolithic. An Upper Palæolithic corresponding to the Aurignacian period is scarcely known in Egypt. M. Vignard observed near Kom-Ombo an industry that might be equivalent to a Middle Aurignacian, with thick scrapers and strangulated blades, and another at the "field of Bagasse" with a great variety of gravers which might be an Upper Aurignacian. But the position in regard to shell-mounds,

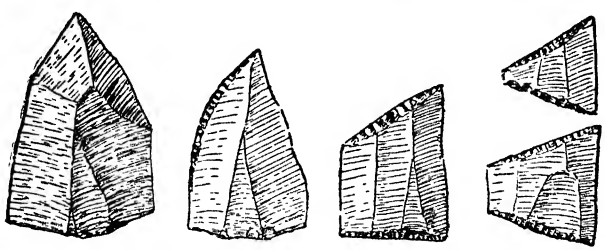

FIG. 30. SEBILIAN INDUSTRY: MORPHOLOGICAL DEVELOPMENT OF MOUSTERIAN TYPE OF POINTED FLAKE INTO TRAPEZE AND TRIANGLE BY WAY OF THE BATTERED-BACK POINT

the presence of axes, etc., and the absence of fauna and stratification make a definite conclusion impossible.

M. Vignard made known, however, a curious development between a Mousterian flake industry and a Mesolithic one containing microliths. Typologically the development seems very clear. As the first term of the series we see flakes of the Mousterian type, truncated right down to the base by a steep retouch that cuts the bulb. Others are chipped in the same manner on one side and thus have the form of battered-back points or trapezes. In this way we reach the Tardenoisian types—triangles, trapezes, segments of circles, and so forth.

M. Vignard endeavoured to prove that this typological

series corresponded to a chronological development. His finds were made in the district of Kom-Ombo (Assuan Province), the site of an ancient lake near the Nile. The successive shores of this lake were occupied by man during a period of desiccation that is now complete, and theoretically this gives some chance of fixing the relative ages of the periods of occupation. M. Vignard gives the name *Sebilian* (Sebil being a village near Kom-Ombo) to this industry, in which he distinguishes three levels, the last being largely microlithic, with numerous micro-gravers. The origin of the micro-graver type would be local, the prototype being flakes with truncated bulb. But the differences in the water-level are only a few feet and the contours of the shores of the lake were very much indented. The areas that were free in the first period continued to be occupied during the succeeding periods and there is no discernible stratification. It is therefore very difficult to establish any certain chronological sequence of distinct industries. It is clear, however, that we have here an industry of an original kind, containing neither pottery nor polished stone. The fauna included, at least at the beginning, large animals such as hippopotamus, buffalo, *bos primigenius*, etc.

Neolithic and Aeneolithic. The connexion of the Neolithic with the preceding phase is not well established in Egypt, despite the large number of finds belonging to this period. Since the earliest work of J. de Morgan and Flinders Petrie at the end of last century attempts have been made to fix a chronology of this Neolithic, into which the use of metals was gradually introduced and which led up to the earliest Egyptian dynasties. These attempts have succeeded in a local and partial way, but here, as everywhere, the question of facies and the absence of good stratification creates great difficulties.

Among what seem to be the most ancient finds are those of *Deir Tasa* in Middle Egypt. Grinding-stones for grain, polished axes of tough stone, and somewhat coarse vessels of baked clay point to a Neolithic phase. The scarcity and scattered situation of the tombs and the presence of shells coming from the Red Sea lead one to think of such semi-nomadic habits as those of the Hadendoas, who last century led a pastoral life in the eastern desert, coming for a few months every year to settle at the edge of the inundated zone to sow and reap. The stone palettes, perforated mace-heads, and pottery, red outside and black within, determine already the special features that were to persist in Egypt for a long time.

On the edge of the depression of the Fayum, the ancient shores of the historic Lake Moeris that extended some 200 feet above the present lake Birket Karun, traces of considerable human settlements have revealed a civilization resembling that of the *Tasians*. The flint industry is very beautiful and highly developed, almost all the pieces being worked on both sides. The predominant types are arrows of various shapes and sizes, frequently with hollow bases, sickle-teeth, and strong leaf-shaped points that may have served as spears or knives. The flint axes and even some of the blades were sometimes polished. The perforated stone clubs and the palettes are an essential part of the equipment. Bone implements include harpoons with cylindrical handle and barbs well detached, and cylindrical points tapering at each end, which might be fish-hooks, awls, etc.

Some of the pottery forms are identical with those of Tasa. The articles of adornment include in particular necklace beads of ostrich eggshells. The cereals grown were spelt and barley, the very ones that are still cultivated in Egypt. They were stored in silos dug in the

ground and covered with mats, and were ground on slightly curved stones. Domestic animals consisted of oxen, sheep, goats, and pigs. At *Merimde*, on the western edge of the delta, the Austrian mission has recently discovered an industry which appears to be a mere local variant of those of Tasa and the Fayum.

The position of these various sites, somewhat removed from the river, the remains of the roots of trees found there, and also the fauna, show that the country was much less desert and the climate wetter than nowadays.

Tombs have been found at Tasa and Merimde in which the skeletons are doubled up, seated, or lying. The skulls are dolichocephalic but the face seems wider than that of men of the following period.

This old Egyptian Neolithic, whose roots are not to be found in the local Palæolithic, shows among its amazing wealth of forms all the essential features of the Robenhausian Neolithic industry of Europe. Is it the parent of the latter, or does their common ancestor come from elsewhere?

The Tasa and Fayum period seems to have been followed by that of *Badari*, named after a district in Middle Egypt. The *Badarian* industry marks a development in industry and luxury. The red pottery with black edges is very well finished and the taste for 'useless' labour is shown by vessels of hard stone, bowls, statuettes and combs of carved ivory, and beads of polished quartz and feldspar. Copper appears among the articles of adornment in the form of little tubes mounted as necklace beads. But the majority of the implements and weapons are still made of stone and are similar to those of the Fayum: the winged and stemless arrow, double-sided leaves, polished axes, and sickle-teeth are of the same type. There are, however, some notable differences, such

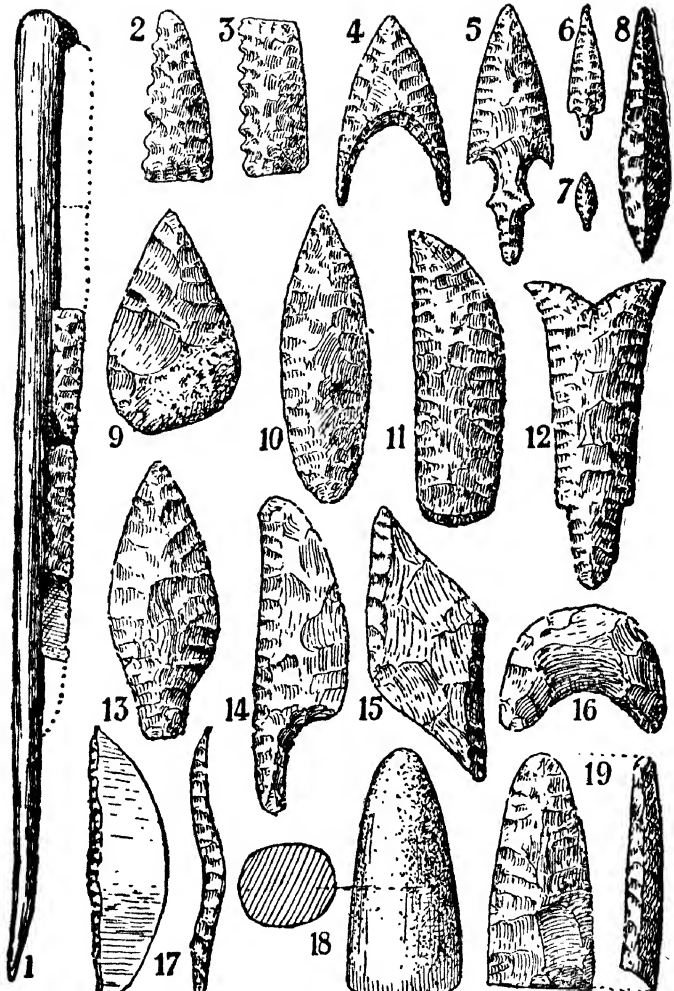

FIG. 31. NEOLITHIC INDUSTRY OF THE FAYUM (EGYPT)

1, hafted sickle; 2, 3, sickle-teeth; 4–7, arrow-heads; 8, point, triangular section; 9, 10, 11, 13, leaves (knives, etc.) of various shapes; 12, knife with fish-tail end; 14, shouldered leaf; 15, diamond-shaped implement, bevelled; 16, thick crescent implement; 17, gull's-wing blade; 18, polished axe; 19, chisel or adze.

as the presence of big planes on a core base that are not found in the Fayum. Moreover the Badarians did not use the flint in slabs from the local deposits in the same way. Some have therefore been inclined to conclude that they were of foreign origin, but the grounds for speculation are very slender.

What seems certain is the connexion between this Badarian culture and (*a*) the earliest known Egyptian Neolithic and (*b*) the succeeding phase, called *predynastic*, which itself passes into the period of the Dynasties by a perfectly continuous development. Endeavours have been made to follow this development and to adduce as evidence whatever may indicate foreign influences, particularly sudden intrusions which would point to the invasion of the country by 'new' races. There is no doubt that influence, infiltration, and invasion have played their part. The tombs themselves have revealed the presence of various physical types, some of which have left their successors in that region—*e.g.*, the present-day Bejas of the Eastern Sudan resemble the predynastic men of El Amrah. But there is nothing to indicate great invasions or upheavals of distant origin, and the cultural unity of Egypt from the Neolithic to the historic period remains a striking fact. It yields a valuable light to illuminate the earliest phase by reference to the latest.

We cannot attempt, even in outline, to present the old Egyptian civilization, which by this time had become so complex. We will merely say that the earliest predynastic peoples, direct successors of the Badarians, are called *Amratians*. A certain number of their villages and cemeteries are known in the southern zone, in Nubia. They dwelt in round huts, and there is no specially rich tomb to indicate the existence of royalty or a powerful aristocracy. They used a little copper for small objects, such

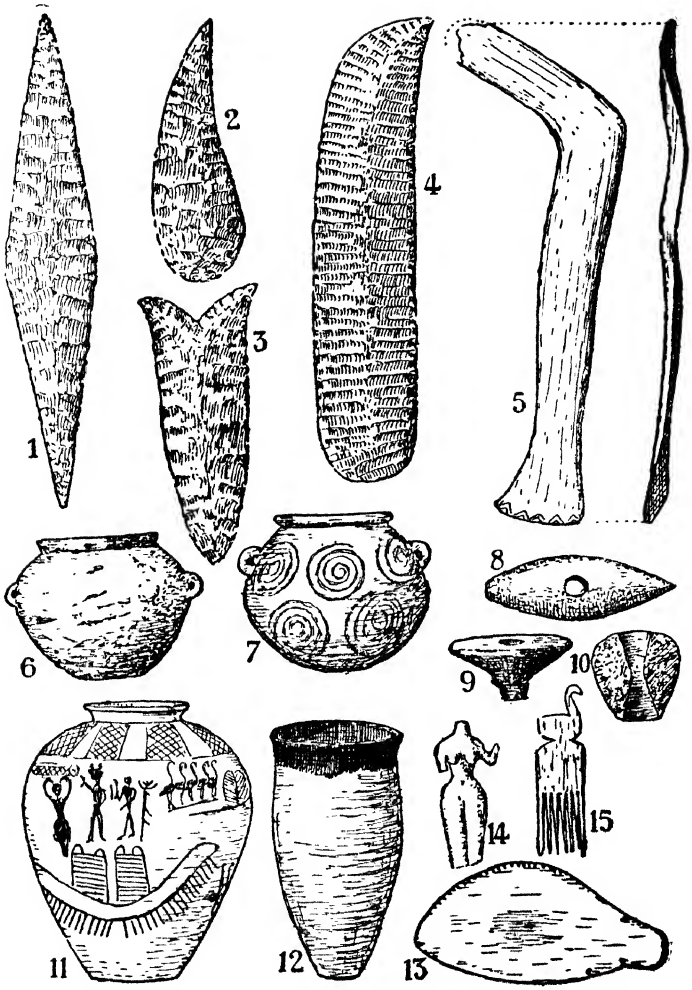

FIG. 32. AENEOLITHIC AND PREDYNASTIC INDUSTRIES OF EGYPT

1, diamond-shaped knife; 2, comma-shaped knife (Amratian type); 3, swallow-tail knife; 4, scimitar knife (Gerzean type); 5, boomerang (Badari); 6, stone vessel; 7, similar pottery vessel with painted spirals; 8, perforated axe-hammer; 9, discoid mace-head; 10, round mace-head; 11, vessel painted with human, animal, and vegetable figures; 12, red vessel with black edge; 13, schist palette, fish-shaped; 14, funerary statuette; 15, ivory comb with bird outline.

as pins or fish-hooks, but the rest of their implements and weapons were of stone or bone: sickle-teeth, scrapers, large knives or spear-heads beautifully retouched—of which the most striking are the leaf type, the 'comma' type, and the fish-tail type—and arrows with concave bases were all made of flint, and discoid clubs with cutting-edges were of tough stone worked by polishing. Most of the harpoons are of bone and of rather flattened shape. The pottery is even by that time rich and varied: there are vessels decorated with figures of men and animals in a somewhat mediocre kind of art. Human or animal figurines—often hippopotamuses and birds—were modelled in clay or carved in stone or ivory.

The civilization called *Gerzean* seems superior to the Amratian by reason of its richness, and differs from it in certain details. Among stone implements the maces are pear-shaped instead of discoid, scimitar-shaped knives take the place of the comma-shaped ones, and so forth. Metal, too, is more abundant, flat axes and daggers of copper being used. The most characteristic kind of pottery is of a buff colour painted in dark red. Finally, the jars with wavy edges, whose type gradually changed, furnished Flinders Petrie with the first means of fixing a chronological system that has now become the standard one, and which is a remarkable application of the archæological method.

Faced by tombs of various periods—or, more accurately, belonging to successive phases of the same period—Flinders Petrie sought to classify them according to the degree of development (whether improvement or decadence) of typical elements. This order of industrial succession forms a relative chronology in which the dates of succession are noted. These *Sequence Dates* (abbreviated to S.D.) consist of numbers from 1 to 80, and, according to the author, they cover about two millenniums. He took

the figure 30 as his starting-point for the earliest materials known to him—corresponding to our Amratian—and reserved the lower numbers for future discoveries. The Gerzean period would then commence at S.D. 45, while S.D. 80 coincides by definition with the beginning of the Dynasties (Thinite period), about 3300 years before our era. Stratigraphical observations enabled the accuracy of Flinders Petrie's classification to be confirmed at a later date in regard to certain points.

Egyptian prehistory leads us to some important observations of a general nature. We notice in the first place that the very rich civilization and the complex and powerful social organization that built the great pyramids still made use for the most part of stone implements, which proves that the development of metallurgy is not, as is often believed, a measure of the degree of civilization.

It seems certain that the main cause of progress was the compulsory concentration, due to the general drying up of the country, of great human masses in a comparatively small but fertile area. The agricultural development of these regions necessitated irrigation, and therefore enforced a measure of agreement, a social organization, and the undertaking of *public works*. The union of the people into numerous groups led to the *division of labour*, and the mixture of different racial elements no doubt also strengthened the human mass physically and intellectually by stimulating its inventive faculties.

It seems on the face of it that the influence of so powerful a centre of civilization thus formed in Africa must have extended widely over that continent. Traces of it have indeed been found, and signs of this influence are still to be seen. But the very cause which produced the unevenness of the cultural level tended to maintain it. The Egyptian civilization, born of a concentration in

very peculiar local conditions, did not seek to extend: it was not transferable. A few small elements alone were capable of being exported, and that is, no doubt, why Egyptian influence on the rest of Africa was not so extensive as might be expected.

It must be noted in conclusion that in face of the striking fact of the unity of Egypt—"the whole of it is the gift of the Nile"—is the equally certain fact, attested by history, of the duality of Upper and Lower Egypt. If the former is African, wedged into the continent, the latter, a border-land and a land of alluvium reclaimed from the sea, looks towards Asia, is closely connected with her, and from the cultural point of view has had on many occasions to double the part of a creative centre and a bridge. Direct documents are unfortunately lacking in these lower lands, and we shall have to seek elsewhere for the archæological proofs of this undoubtedly important part played by Lower Egypt.

2. North Africa (the Magrab)

This region, known also as Africa Minor, is particularly interesting to us Europeans because it is the natural route by which the influences and invasions of Africa and the East can enter Europe, and vice versa. This has been its *rôle* in the historic period. Situated face to face with Southern Europe it is hemmed in between the sea and the vast Sahara desert in an almost insular position. It forms one great archæological unit.

Early Palæolithic. In many places in the Magrab an industry is found comprising double-sides and flakes entirely resembling those of our Chelleo-Acheulian. In some places it has been possible to make palæontological and geological observations. Thus several deposits containing a pleistocene fauna and human industry have

been found in little mounds of sand, gravel, and tufa surrounding large springs. At Palikao (Ternifine), near Mascara (Oran), Pallary found a Chellean industry in association with a fauna comprising large mammals that have now disappeared: *Elephas atlanticus*, *Rhinoceros mauritanicus* (or *simus*), *Hippopotamus amphibius*, *Equus mauritanicus*, and *Bubalus antiquus*. At Lake Karar, to the north of Tlemcen (Oran), a deposit similar in situation and fauna yielded a very fine industry with double-sided and single-sided implements (published by Boule).

At Ouzidan, near Tlemcen, there have been found Chelleo-Acheulian pieces in gravels 182 feet above the present river-level. At El Hank, near Casablanca, Antoine discovered a raised beach at 40 to 53 feet with an abundant Chellean industry employing quartzite pebbles. Some rolled pieces prove that the occupation and the raising of the sea-level were contemporaneous.

Near Gafsa, in Southern Tunisia, banks of gravel have been observed, with a Chelleo-Acheulian industry, which had been tilted sometimes as much as 45° by local folding. Deposits containing flints of Mousterian appearance rest on these gravels and have remained horizontal, thus indicating the date of the movement.

Middle Palæolithic. At some surface sites there has been found (*e.g.*, by M. Reygasse at Fedj-el-Batna in the south of Constantine) a flake industry with points and side-scrapers of the standard Mousterian type. In the cave of Ali Bacha, near Bougie, M. Debruge found in a deposit a very simple flake and blade industry in conjunction with an early fauna comprising rhinoceros, *Bubalus antiquus*, antelope, hyena, bear, etc. But what is usually found at numerous sites throughout the Magrab is an industry of Mousterian appearance, with discoid cores, flakes of Levallois type, strong blades, points

retouched on one side, and scrapers, in conjunction with a large proportion of pedunculate implements, including points, scrapers, and flakes with sharp cutting-edges furnished with a large tang. Reygasse was the first to show that this Mousterian assemblage with the addition of pedunculate pieces forms an archæological unit, and that it had some geological antiquity, being found sometimes buried under several yards of alluvia in places where such deposits could not be produced with the topography as it is now. He gave to this industry the name *Aterian*, from the deposit of Bir-el-Ater (Tebessa) where this phenomenon has been best observed. This Aterian seems from the developed appearance of its shapes—pedunculate pieces and long scrapers—as well as from its position, superposed on the triangular flake Mousterian in Egypt (see p. 144), to be a final Mousterian phase. It has given rise to much discussion, especially before it was clearly defined by Reygasse, for as a matter of fact the question is complicated by the existence in higher levels of pedunculate pieces more or less resembling the Aterian ones.

Quite recently Ruhlmann has discovered the Aterian industry in the caves of El-Khenzira (Morocco) lying beneath an Ibero-Maurusian level (see p. 160) and accompanied by an archaic fauna containing *Rhinoceros Merckii* and *Gazella crassicornis*. In the same way Vaufrey has found the Aterian under Capsian beds at Aïn-Metherchem, in Tunisia.

Again, Reygasse has observed in Southern Constantine, near the fort of Sbaïkia, an industry comprising double-sides of various types, graduated, so to speak, from the most usual Acheulian type to small thin leaves which, apart from slight differences, are similar to the double-sided leaves of Solutrean and certain Neolithic varieties.

Unfortunately there are no stratigraphical facts available for dating this Sbaïkian industry in relation to the Aterian or Mousterian, or for ascertaining whether the established morphological fact bears witness to a real connexion between an Early Palæolithic industry and certain Upper Palæolithic or Neolithic ones.

M. Reygasse also found in Southern Constantine, at a place called Khanguet-el-Mahrouguet, an industry with Campignian technique, including picks, *tranchets*, and axes, which seems to be associated with a typical Acheulian industry. On this industry, which he calls *Mahrouguetian*, we must await further information.

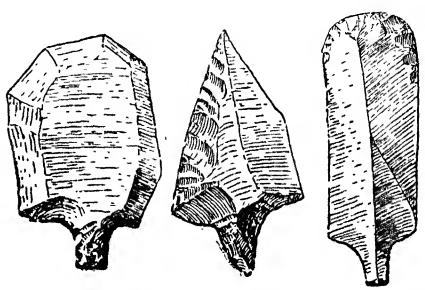

FIG. 33. ATERIAN INDUSTRY
Pedunculate oval flake, point, and scraper.

Upper Palæolithic. In an inland region corresponding to the ancient Gætulia, in Southern Constantine and part of Southern Tunisia, extending from the lofty plains of Sétif to the Gafsa Hills, we find an abundance of open-air sites on mounds of debris. These attain a height of 10 to 12 feet and a length of 500 feet, and are formed for the most part of ashes and snail-shells, whence comes their name of *escargotières* or 'snaileries.' They contain a stone industry that was called first *Gætulian* (Pallary) and then *Capsian* (de Morgan) from the type locality El-Mekta, near Gafsa (the Latin *Capsa*). Some Capsian habitations were in rock shelters.

The stone industry was essentially founded on blades. Three types of implements dominate the rest: points

with battered backs and sharp cutting-edges, resembling the blades of a pocket-knife; gravers, generally made from the corner of a blade with a retouched truncation; and various scrapers, discoid or elongated, and concave scrapers or notched blades. Gravers and scrapers are frequently thick. To this heavy equipment are added small pieces such as battered-back bladelets, segments of circles, triangles, and trapezes, which often escaped the earliest excavators, at any rate in part. Flat stones for grinding, little worked and not very plentiful, do not imply the existence of a seed-growing type of agriculture.

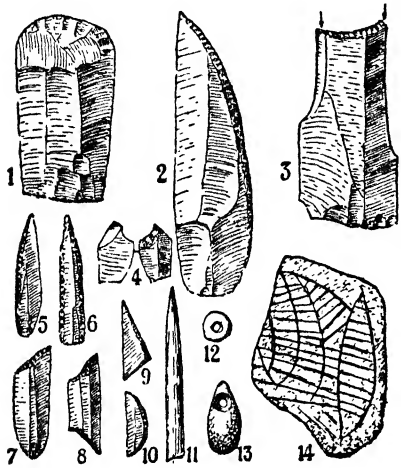

FIG. 34. CAPSIAN INDUSTRY

1, scraper; 2, battered-back point; 3, angle-graver; 4, micro-graver; 5, pen-knife-blade point; 6, small awl; 7, obliquely truncated blade; 8–10, microlithic pieces: trapeze, triangle, segment of circle; 11, bone point; 12, ostrich eggshell bead; 13, hæmatite pendant; 14, lines engraved on stone.

The bone industry includes scarcely anything but points of various shapes made from long bones, sometimes split and sometimes not, sharpened at one end and sometimes both. Various kinds of spatulas and chisels, or perhaps smoothing tools, were made likewise from splinters of bone flattened at the end. Articles of adornment are represented by pendants and little perforated rounds of ostrich eggshell.

It has been scarcely possible to observe stratigraphical

facts, even though a large number of deposits have been investigated, but none the less it seems that the Capsian can be divided into several phases, or at least two. The first comprises in particular the large implements just mentioned, and in the second, which may be called Upper Capsian, these large implements are no longer represented except for specimens that are rare and even reduced in size, while the basis of the industry is microlithic. In the rock shelter of Relilaï (Tebessa) Vaufrey found an Upper Capsian level superposed on a thick 'snailery' of typical Capsian. The microliths of the upper levels belong to the preceding types but with more variety and more perfection also, apparently. In certain beds, as at Négrine-el-Quédim, there is a predominance of regular trapezes, triangles, and micro-gravers. In others, such as Mechta-el-Arbi, on the other hand, there are small battered-back bladelets, often sharpened at both ends, and shaped like a segment of a circle. The question of local varieties is mixed up with that of chronological development.

Outside Eastern Barbary, or Gætulia, the region of the Tell from Tunisia to the Atlantic coast of Morocco has not yielded any Capsian industry. On the other hand there are fairly numerous beds, either in caves or in the open, which in ashy deposits abounding in snail-shells contain an industry apparently equivalent to the Upper Capsian. It is composed almost exclusively of microliths: simple blades or blades with slightly retouched cutting edges, small scrapers, often discoid, and especially small bladelets shaped into points with battered backs and sharp cutting-edges. Notched blades, more or less regular trapezes, and micro-gravers (occasionally even angle-gravers) are also found in proportions varying from bed to bed. This industry, whose typical bed is that of

the *Mouillah*, near Oran, was called *Ibero-Maurusian* by Pallary, who wished thus to mark its similarity or identity with an industry described by Siret as Upper Palæolithic in South-east Spain. Gobert and Vaufrey objected that this assimilation was not possible because of its essential difference from the Spanish implements, the chief of which is the angle-graver, and which seem related rather to the Franco-Cantabrian Palæolithic. They, with the Abbé Breuil, proposed to substitute the term *Oranian* for Ibero-Maurusian, but this suggestion does not seem to have been adopted, being opposed to the rule of priority.

L. Joleaud, who remarked the geographical localization of the Ibero-Maurusian and the Capsian, regards it as expressing a different manner of life which would distinguish the inhabitants of the Tell then, as it does to-day, from those of what is now desert steppe: the former were sedentary, the latter semi-nomadic. The two industries would be at least partly contemporaneous.

The fauna can be only imperfectly known from the chronological point of view, simply because of the differences in conditions of life between the two zones. But, however that may be, the Capsian beds yield animals that have disappeared, like the rhinoceros (*cf. simus*), elephant, great oxen (*Bos primigenius* and *Bubalis bos elaphus*, according to Pond), red deer, gazelles, antelopes, lion, ostrich, etc. The *equidæ*, so plentiful in the Old Capsian, seem to disappear entirely in the Upper Capsian. However, in the Ibero-Maurusian in the Alain rock-shelter near Oran Pallary found the zebra with the large *bovidæ*, bubalis, deer, gazelle, lion, panther, etc., and the present-day snails of the district.

All we know of Capsian man is some skeletons in the

Upper Capsian (finds of Mercier and Debruge at Mechta-el-Arbi, near Chateaudun-du-Rhumel, studied by Bertholon and Lagotala) and in the Ibero-Maurusian (some forty individuals discovered by Arambourg in the cave of Afalou-bou-Rhummel and studied by him in collaboration with Boule, Valois, and Verneau). The *Mechta-el-Arbi race*, with which that of Afalou is connected, differs from the natives of to-day and from the European Palæolithic and Mesolithic. The size is above the average and

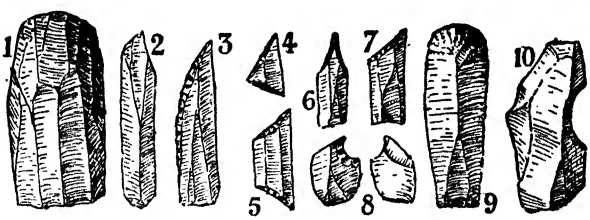

FIG. 35. IBERO-MAURUSIAN INDUSTRY (MICROLITHIC)

1, core with two platforms; 2, blade; 3, battered-back blade; 4, triangle; 5, trapeze; 6, point; 7, truncated blade; 8, micro-graver; 9, end-scraper; 10, concave scraper.

the legs and forearms are very long. The skull is dolichomesocephalic, brutal in appearance, with promine superciliary arches, wide face, and enormous ma apophyses. The teeth are frequently carious upper middle incisors have often been removed as a matter of ritual.

When the Capsian industry was made k its resemblance to the Aurignacian was and for some twenty years hypothese structed as to the African origin of ou But there is nothing that serves t The Upper Capsian, called by *noisian* in the Négrine-el-Q Maurusian are microlithi

by transitional deposits with the Neolithic. They seem in inspiration and period to be the equivalent of our Mesolithic, and Vaufrey has insisted on their recent character. It is therefore probable that the beginning of the French Upper Palæolithic corresponded in Africa to the Final Mousterian with pedunculate implements, and that the Capsian belongs to a more advanced stage.

Neolithic. A fair number of sites, including the pit-dwellings studied by F. Doumergue in the neighbourhood of Oran, at the Spanish Battery, show the appearance of pottery among an Ibero-Maurusian industry. In some of them, besides pottery, have been found double-sided arrows with or without tang, and polished axes, though the latter are, generally speaking, always rare in Africa Minor. It was recently pointed out, too, by Vaufrey that the human skeletal remains in the Neolithic caves of Oran belonged to the Mechta-el-Arbi type.

In the east the excavations of Dr Gobert in the rock-shelter of Redeyef (Gafsa district) have revealed in a bed ive feet thick, without any discernible stratigraphical isions, an industrial development approaching the hic. At the base the industry comprises battered-es, notched blades, and microlithic elements bone points and ostrich eggshells engraved dots; and no pottery or polished axes. are the same forms, except the blades ing-edges, and in addition there are leaf- d arrow-heads, winged and tanged, axes, perforated mace-heads, and ostrich eggs bear some carved ntian objects. Dr Gobert , and then *Intercapsoneo-* edeyef (found also at

Aïn Aachena, etc.), which is no longer either Gætulian or Capsian and yet lacks the essential features of Neolithic.

Summing up, what is found throughout the Magrab as Neolithic, is a result of simple infiltration into unchanged Mesolithic (or Upper Palæolithic) surroundings.

Pallary had given the name *Mauretanian* to this Neolithic, with its Ibero-Maurusian or Gætulian substratum. Vaufrey calls it *Neolithic in the Capsian tradition* and assigns to it the earliest of the wall engravings so numerous in North Africa. On the one hand, indeed, in the Capsian centres the engravings on flat stones or on ostrich eggs are confined to simple straight lines (often in parallel groups), and, on the other hand, in the neighbourhood of the rock pictures we find no Capsian implements but often Neolithic in the Capsian tradition. Finally, Egyptian influence is clearly enough apparent in a number of these engravings, such as animals with a solar disc between their horns. As for the presence among these figures of animals that have now disappeared, such as hippopotamus, elephant, rhinoceros, ox, bubalis, etc., this does not necessarily indicate great antiquity. Geologists and palæontologists like Joleaud have shown that many elements of the existing Central African fauna survived in North Africa, especially the southern part, until Neolithic times, and the disappearance of some of them is even quite recent.

In another direction the Abbé Breuil has announced with Dr Clergeau the discovery of an engraved and painted egg originating in an area that seems to be "developed Capsian," and he thinks that the naturalistic art whose productions seem to him in some cases "comparable to our Franco-Cantabrian Aurignacian" has its origin in the Capsian. This conclusion unfortunately rests only on scanty premises.

3. The Sahara and the Sudan

The vast area of the Sahara, now a desert, contains very numerous traces of human occupation, with rich stone industries ranging from Chelleo-Acheulian types to a very highly developed Neolithic. This proves how recent was the drying up of the Sahara—a fact established also by other indications of various kinds, such as surface relief, fauna, historical documents, and so forth.

Unfortunately almost the whole of the documents have been gathered on the surface, and in many cases wind erosion and torrential drifting have caused rearrangement and mixing, but some fairly clear conceptions emerge from the discoveries as a whole.

To begin with, there is the fact, insisted on by E. F. Gautier, that the Atlas has played its part as a racial frontier since a period anterior to the Neolithic. Secondly, this early Sahara had a fauna resembling, on the whole, that of the Sudan to-day. Even in our time there have been found survivals of it, such as the silures (sheath-fishes) of the Biskra pools, the crocodiles of the Mihero *wadi*, and so forth. The great desert must therefore be regarded as representing the conquest of drought over a region of which the Sudan is merely a sample.

The *Lower Palæolithic* is represented by magnificent implements of Chelleo-Acheulian types. In the Western Sahara (Erg Iguidi, etc.) there is found among these types a great abundance of double-sides ending in a wide bevel, called by some authors 'basils' or 'hatchets.' A very extensive site recently discovered at the *erg* (sandhill) of Tihodaïne, south-east of In-Salah, has revealed the association of large mammals (elephant, etc.) with a very rich Acheulian industry.

The *Middle Palæolithic* is represented typologically by

flake industries of Mousterian appearance, and above all by very numerous remains of Aterian industry. There are sometimes found associated with Neolithic arrows heavy spear-heads differing hardly at all from Aterian points. But since the Capsian and Ibero-Maurusian seem to be absent from the Sahara region, at least in any very characteristic form, we are led with Reygasse to the conclusion that the Aterian was able to continue there throughout the whole of the Upper Palæolithic.

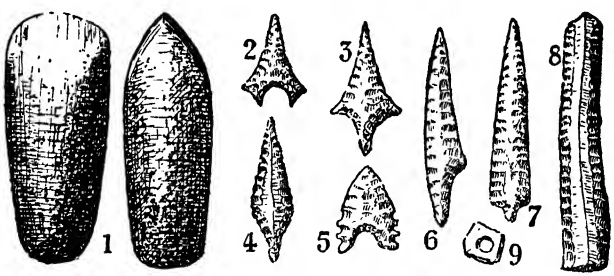

FIG. 36. SAHARA NEOLITHIC

1, cylindrical axe; 2, Eiffel Tower arrow-head; 3–7, various types of arrow-head; 8, blade with retouched edges; 9, ostrich eggshell bead.

The *Neolithic*, extremely plentiful in the Sahara, seems dominated by two things: the great number and variety of arrow-heads and the scarcity of polished axes. But modern explorers returning to the recognized sites often find merely a simple and fairly coarse industry of blades, flakes, etc., for the early searchers have collected the arrow-heads. It is probable that the polished axes have in like manner been taken away by the natives in historic times as *chagour es sma*, or 'heavenly axes,' and that what are studied are often distorted industries. Certain types of arrow-heads, such as the pistil-shaped, the shield-shaped, and the 'Eiffel Tower,' are celebrated, and

there are numerous variants and local types. Considered as a whole, many types tend to resemble the Egyptian Neolithic, and seem to point to some connexion with it.

Finds of rock paintings and engravings in the Sahara have increased during recent years. They seem to belong to several periods ranging from the end of the Palæolithic to the present day. Some depict animals of the Central African fauna: elephant, rhinoceros, hippopotamus, and giraffe; others show Egyptian influence in representations of sacred animals; others again—vast and animated frescoes of human beings—seem akin to the productions of the Bushmen. The study of stroke technique, whether U-shaped or V-shaped, whether glossy or not, and whether the patina is more or less black or red, and so forth, is very attractive at first sight as a means of establishing the relative ages of the engravings, but in practice it is apt to be rather deceptive because of the complexity of the subject, and it certainly requires a great deal of care.

On the frontier between Algeria and the Sudan, in the Ténéré, some sites contained grooved and polished axes of a simple type: Reygasse described this Neolithic area and named it *Tenerian.* Similar discoveries have quite recently been made in Africa by A. Ruhlmann, first in the Niger region and then in Morocco (Wadi Beth). But the grooved implements, axes, picks, and mallets, to be met with all over the world in scattered deposits, appear to belong, generally speaking, to the beginning of the Age of Metals. The picks and mallets are essentially mining tools, and are found in ancient copper, salt, and flint workings.

In the Sudan, near Tichit, on the Aouker, sites of important fortified Neolithic villages have been explored.

The industry comprised arrow-heads and laurel-leaves of polished schist, and others of flint which had been first polished and then retouched. Hubert, Laforgue, and Vanelsche call this technique *Eglabian.*

In the Bamako region Waterlot discovered a coarse industry in tough stone (diabases) comprising discs and flakes from them, heavy double-sided leaves, and polished axes with the peculiarity that all the intermediate steps can be seen between the coarse double-sides and the completely polished axes.

4. Central and West Africa

Many times since the first discoveries of Zboïnski in 1884–85 has attention been called to Stone Age sites in the Congo basin. The industrial types collected recall shapes known elsewhere and are, on the whole, simple ones—double-sided leaves, oval scrapers, and arrow-heads—but with peculiarities of manufacture, especially their great thickness and a certain roughness of workmanship that may be due in part to the material employed—sandstone and reef quartz.

Dr Menghin, having undertaken the study of industries collected in the Congo basin, regards them as forming a whole and belonging to a *Tumba* culture, named from Tumba (lower Congo), and to be included in a "West African cultural cycle." This *Tumbian* would have developed from a Palæolithic *coup-de-poing* industry—*i.e.*, Chelleo-Acheulian double-sides—gradually becoming a Neolithic with leaves and pedunculate arrow-heads. In other respects Menghin notes similarities between his Tumbian and the standard Campignian, and, by the morphological parallels that he establishes by jumping over continents and geological periods, he seeks for filial

relationships between the various elements of an immense *coup-de-poing* civilization, or *Faustkeilkultur*. But unfortunately these huge intellectual edifices are lacking in solid foundations.

Since then very important excavations have been made in the Congo area by M. Cipriani and M. Colette, and quite recently by M. Cabu. The latter has taken advantage of the digging of a great drainage canal near Leopoldville to study a section several miles long in the Quaternary. The layers that have been cut through have furnished him with several industrial levels in superposition, and the deepest of them at least he assigns to the Palæolithic. His first conclusion is that the term *Tumbian*, applied, he says, to an industry apparently homogeneous, without deep patina, and comparatively recent, must be rejected, for it is actually a complex of different industries. He proposes, at least provisionally, to accept the division into levels made by Colette, as follows: (1) *Kalinian* I and II—lower levels showing resemblances to the Sbaïkian and even the Aterian of North Africa; (2) *Djokocian*, which would seem to be equivalent to a crude Aurignacian and more or less similar to the Capsian; (3) *Leopoldian*—a regional type of Neolithic. Another Neolithic facies, perhaps more recent and containing especially polished axes (generally of hæmatite and triangular in shape) is confined to the region north-east of the Belgian Congo. The authors give it the name *Uelian*.

More complete studies and publications must be awaited before we can determine the relative antiquity and order of succession of the industries of the Congo, and discover in particular whether there is actually an Early Palæolithic with Chelleo-Acheulian double-sides, as Babet and Lombard think they have observed at

Pointe-Noire, near Brazzaville. But it can be said even now that the various stone industries of the Congo show similarities of technique which seem to indicate some kinship, and therefore local continuity.

5. East Africa

In 1895 H. W. Seton-Karr made known some implements of Chelleo-Acheulian and Mousterian type found in Somaliland; and some rapid explorations in Abyssinia, first by de Montfreid and then by Father Teilhard de Chardin and the Abbé Breuil, have revealed the existence there of these same types—Acheulian double-sides, large flakes resembling Levalloisian types, and leaves of the Solutrean kind, thick but well worked.

In a thick bed of ashes inside a cave Wernert thought he could distinguish three levels indicating a development of which the last phase resembled the Solutrean, but pottery was found in conjunction with it, except at the very bottom of the deposit. Many wall paintings, however, have been examined depicting animals which, if not geologically ancient, have at all events disappeared from the country, such as humpless oxen instead of the modern zebus, buffaloes with turned-down horns, deer, etc., which may correspond to a Neolithic more or less contemporary with that of Egypt.

Finally, at Djebel-Tine, near Obock, on a pebbly plateau, there are circles cleared of stones, like sites for huts or tents. They contain a small stone equipment of unpolished flint somewhat similar to that of the last Bushmen in South Africa. Among these circular sites the Abbé Breuil examined one of rectangular shape with a semicircular appendage on one side, forming a *mihrab*,[1]

[1] A kind of niche in the wall of a mosque. in which the *imam* (priest) stands.

so that the place is regarded by the natives as the site of an ancient mosque. If all this is of the same period, as seems probable, it proves that the stone industry continued in these parts until the time of Islam.

The researches made in **Kenya** since 1926 by an English mission directed by L. S. B. Leakey have achieved considerable fame. Their importance is due to the possibility of studying there the succession of industries in connexion with geological phenomena. In the volcanic region to the west of Mount Kenya there are lakes with no outlet, their water-level resulting from equilibrium between the rainfall supply on the one hand and evaporation or sometimes percolation on the other. At the present time they are fairly near to drying up. But these vast natural reservoirs, which have acted as rain-gauges, bear on their sides the marks of the high levels reached in early times, and characteristic deposits have been formed on sites which were for a long time the shores of the lake. Thus we can discover signs of the periods of stability which marked the limit of the principal oscillations of level, and we can distinguish wet or pluvial periods and dry ones. The human industries to be found in the deposits connected with the alluvial formations of the wet periods, or in subaerial formations corresponding to dry ones, will thus be geologically dated.

Mr Leakey, with the help of collaborators, including the geologist Solomon, seems quickly to have obtained remarkably complete results, bringing to light the succession of climatic periods, with information as to the relative fauna, the sequence of stone industries, fossil human races, and finally the parallelism between these things and the results scarcely yet established in our part of the world after nearly a century of toil on the part of European scholars. Leakey, however, has shown some hesitation,

and his classification, like the lake-level, has oscillated. At first he distinguished five wet periods separated by dry ones, but in his work published in 1931 he indicates only two main pluvial periods and two more recent wet ones. He describes the corresponding industries, giving them the names of the standard industries which they resemble. According to him the periods are, in chronological order, as follows:

(*a*) **First Pluvial Period: Kamasian.** This term was coined by Gregory to denote a thick series of pebbly and clayey alluvia marking a high level of Lake Baringo. Corresponding to the Kamasian (divided into lower, middle, and upper levels) are industries called *Kenya Chellean*, *Upper Kenya Chellean*, and *Kenya Acheulian*. But the Chellean has been distinguished from the Acheulian only because it was found in a rolled state in gravels where Acheulian pieces were found unrolled. We have already discussed the value of such a method of classifying (see p. 39). The pieces are often of fine obsidian.

The *Nanyukian*, not stratigraphically dated, would be an advanced Acheulian or a Mousterian with double-sides and side-scrapers, which might be placed in the first interpluvial period. This period was marked geologically by volcanic activity and earth movements.

(*b*) **Second Pluvial Period: Gamblian.** This comprises two maxima separated by a phase of lacustrine retreat. The name comes from Gamble's Caves, dug in a cliff at the same level as the shore which corresponded to a maximum height reached by Lake Nakuru.

Excavations in Gamble's Cave No. 2 have exposed a very important section, in which Leakey distinguishes fifteen strata. The lowest one, formed of sand and gravel with fresh-water shells, would correspond to the second pluvial maximum of the Gamblian at a level of about

500 feet above the present water-level. It contains an industry (rolled) that Leakey calls Lower Kenya Aurignacian. Above this, and separated from it by barren beds, are three more industry levels.

During the Gamblian period there was a twofold stone industry. Leakey distinguishes a *Kenya Mousterian* and a *Kenya Aurignacian*—contemporary, since they are found in alluvial formations of the same date, but having each its own individuality, since they sometimes appear separately. These industries would have developed on parallel lines—hence the division of each into an upper and a lower.

The *Kenya Mousterian*, which is peculiar to the valley of the Malewa, at Naivasha, includes flakes made from discoid cores and standard single-sided points. It seems to improve at the upper level and ends in a third level, called by Leakey *Kenya Still Bay* (see p. 177), in which, next to points and single-sided side-scrapers, are found real thin leaves recalling Solutrean or Neolithic types.

The *Kenya Aurignacian*, of whose two levels one would be anterior and the other posterior to the second Gamblian pluvial maximum, is more reminiscent of Capsian than Aurignacian. Its dominant types are battered-back blades, and in the upper level angle-gravers, often thick and on a retouched truncation, as well as microliths—segments of circles, trapezes, and even more or less distinctive micro-gravers. Scrapers are plentiful, but have nothing distinctive about them. Along with this industry are found necklace beads of ostrich eggshell and pierced shells of shellfish. Taken as a whole the industry much resembles the Capsian, but there is in addition some pottery, a fragment of which bears a wickerwork pattern, and a fairly recent note is supplied also by a very deep oval grinding-stone or mortar, complete with pestle.

Above this level in Gamble's Cave No. 2 occurs another

occupation level, important for the presence of tombs. Leakey calls it *Kenya Late Aurignacian*, but he gives no precise typological definition, for want of sufficiently numerous materials.

(*c*) **First Wet Period: Makalian.** This period has left lacustrine deposits superposed on the Gamblian ones but quite distinct from them. In Gamble's Cave No. 2 they are separated from those of the Upper Gamblian by a bed of æolian sand, a sign of aridity caused by drought. The industry that Leakey calls *Elmenteitan* still includes battered-back blades, microliths (especially segments of circles), scrapers, and a few rare gravers, but the most characteristic implement is the scaled flake, which is not found in the preceding levels. Pottery is represented in particular by vessels shaped like a half-gourd or truncated egg, with the edges often thickened or 'hemmed.'

To the end of the Makalian period belong the earliest deposits of an industry that Leakey calls *Kenya Wiltonian*, characterized by small discoid scrapers and microliths, among which segments of circles predominate. There are still battered-back blades, and the pottery is similar to the Elmenteitan.

(*d*) **Second Wet Period: Nakuran.** To the first phase of this period belongs an industry that Leakey calls *Gumban A*, characterized by a special decoration of the pottery, which is covered with deep impressions sometimes imitating wickerwork. *Gumban B*, at first called *Nakuran*, is known in a burial place at Nakuru and includes some kinds of thick bowls or mortars of coarse lava. The stone industry is of obsidian, as is usual throughout the whole of this region, and still includes a few gravers, end-scrapers on blades, and small battered-back blades, with segments of circles predominating.

Finally, Leakey proposes the name *Njoroyan* for a

Neolithic industry characterized by polished axes and known in particular in the Njoro tombs. He thinks that it may be contemporary with the Gumban.

Fossil Man in East Africa. Alongside these discoveries as to the sequence of industries are various finds of human skeletons—first that of Oldoway, made by H. Reck in 1914, and then those of Kanam and Kanjera, made by Leakey in 1931–32. According to Leakey these skeletons, belonging to races of *Homo sapiens*, came from Kamasian beds with Early Palæolithic industries and archaic fauna—a pre-Chellean industry was even noted in association with the dinotherium. So at a period anterior to that in which Neanderthal man prevailed in Europe, *Homo sapiens* would already have excelled in making double-sides in East Africa. The English geologist P. G. H. Boswell came to the conclusion in 1935, after making a verifying expedition to Kenya, that the observations had not been made with the method that was desirable, and that the burials could not be regarded as stratigraphically *in situ*.

In Gamble's Cave No. 2 skulls have been found in the level called *Upper Kenya Aurignacian*. They are dolichocephalic and orthognathous, and appear to be those of proto-Hamites. The Nakuru burials, of the Elmenteitan period, have yielded a fairly large number of skulls, which are not of negro race and resemble the preceding in certain particulars, such as the shortness of the preauricular part of the skull. Skeletons have also been discovered corresponding to the *Wiltonian* industry and resembling those of the South African beds of the same industry. In the Gumban Neolithic there seem to have been several races, one of them resembling that of Nakuru. The undeniable fact is that these are not true negroes. So, whether we judge by industry or by racial features,

East Africa seems to have been connected with the north and north-west rather than with the central and western part of the continent.

With regard to the parallelism that Leakey has tried to establish between the pluvial periods of this region and the European glaciations, we can see nothing in it at present but a bold and premature suggestion. Not only the Makalian, which would correspond to the Bühl stage, but even the Gamblian, which Leakey identifies with the Riss, contain pottery with an industry similar to the Capsian, which is seen in North Africa to be so closely connected by its terminal phase with the Neolithic. We shall see later that the Wilton industry of South Africa has lasted down to our own day. As for the Gumban, iron has been found in one of the tombs of this period. All these facts combine to forbid our attributing great antiquity to Leakey's levels, which are later than the Gamblian.

On the whole, what we see fairly clearly is a Lower Palæolithic developed and simple, a Middle Palæolithic with a tendency to develop, and an Upper Palæolithic passing into Neolithic. Prehistory in East Africa is of quite peculiar interest, because of the abundance of stone industries and the possibility of geological study of the Quaternary, but it will still need prolonged research.

6. South Africa

Chellean or Acheulian double-sides have been found in the region of the Cape for a long time, and were mentioned by Gabriel de Mortillet in 1885. The researches of Péringuey, and later of Goodwin, van Riet Lowe, Hardy, Neville Jones, and others have resulted in bringing to light the very great prehistoric wealth of South Africa

and defining its successive industries. South African prehistorians have been able to make stratigraphical and geological observations similar to those made in Europe, and they have created a special terminology to designate the industries of their country.

I. **Old Stone Age.** To this age belong several industries. The *Stellenbosch* industry is represented particularly in two regions, viz., the mountains of the Cape Province and the valley of the Vaal. It resembles the Chelleo-Acheulian of Europe, but is generally cut from quartzite pebbles or rocks tougher than flint. There are abundant double-sides with a high proportion of 'basils' and associated with worked flakes.

The *Victoria West* industry comprises some usual types of Chelleo-Acheulian double-sides, with which is associated a particular type called 'the Victoria West implement (or core).' This type is akin to the disc or tortoise core. One of the sides, more or less convex, is covered with traces of the primitive working of the core, and about three-quarters of the other consists of a curved fractured surface (Fig. 37, No. 2).

The *Fauresmith* industry, like that of Stellenbosch, contains especially double-sides, but they are often fine and small as in the La Micoque bed. Others are triangular or heart-shaped with one side flattened (recalling our Mousterian shapes). And finally the large side-scrapers or end-scrapers with cutting-edge sometimes almost straight and sometimes curved into an arc, constitute an important element of this industry, which corresponds typologically to the Acheulian and the Mousterian in the Acheulian tradition.

II. **Middle Stone Age.** Several types of industry appear to belong to this period, though it is not possible to arrange them chronologically. On the whole they

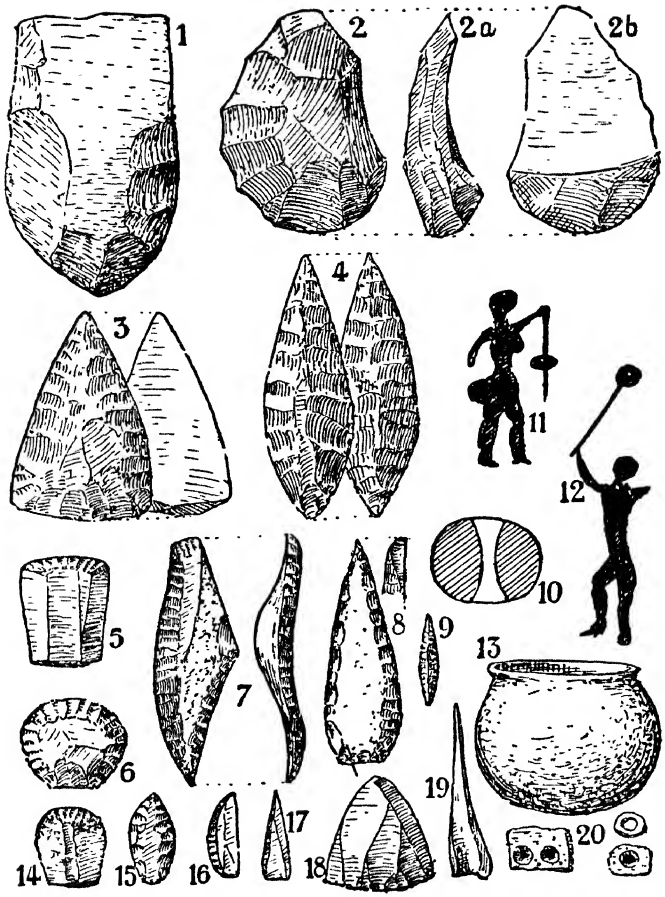

FIG. 37. PREHISTORIC INDUSTRIES OF SOUTH AFRICA
1, 2, OLD STONE AGE; 3, 4, MIDDLE STONE AGE; 5–20 LATE STONE AGE

1, Stellenbosch basil; 2, Victoria West type; 3, single-sided point (Glen Grey); 4, Still Bay leaf; 5, 6, duck-bill and discoid scrapers; 7, concavo-convex side-scraper (Smithfield A); 8, graving-point (Smithfield A); 9, triangular section point; 10, perforated ball or *kwe*; 11, 12, rock paintings showing use of these balls fixed to digging-sticks for women and maces for men; 13–19, Wilton industry (13, pottery; 14, thumb-nail scraper; 15, leaf; 16, segment of circle; 17, fine point; 18, bladelet core; 19, bone point; 20 eggshell beads)

show marked resemblances to Mousterian as well as to the European Upper Palæolithic.

The industry of *Glen Grey* (near Queenstown) contains mostly single-sided points, fairly thick, very similar to Mousterian types which exist also in the old levels of Saint-Acheul. In other localities, such as *Maitland*, we find a modified type, more slender in form and with the bulb thinned by retouches on the lower side. Cape prehistorians regard these as lance-heads.

The *Still Bay* industry, the best known of the Middle Stone Age types, contains as a typical piece the lance-head in the form of a leaf worked on both sides. The Still Bay point or leaf naturally recalls the Solutrean leaf, but it equally recalls similar types known in many places and in many periods.

III. **Late Stone Age.** To this period belong two principal types. The *Smithfield* industry, in the Orange Free State, is a flake industry with a predominance of duck-bill, thumb-nail, and serrated scrapers, etc., and single-sided points, elongated and thick. It also includes pestles and stones worked by piercing, including perforated balls called *kwe*, the twofold use of which is explained both by early pictorial representations and by the recent ethnography of the region: these stones were sometimes fixed to the end of a stick to form a mace, and sometimes placed a third of the way along a *digging-stick* used by the women. Bone awls, necklace beads, palettes, and pottery (round-bottomed vessels) are among the ordinary implements of the Smithfield industry. But it also includes some facies and seems to show a process of development with a tendency towards a gradual reduction in the size of implements. Van Riet Lowe and Goodwin divide the Smithfield period into three levels—A, B, and C, or lower, middle, and upper. One

particular implement, the notched scraper, appears in level B and becomes abundant in level C. The latter contains microliths also, and is connected with some cave-dwellings, whereas A and B are found in open-air sites.

The *Wilton* industry, to be met with chiefly in two centres, Rhodesia and the Cape peninsula, strongly resembles that of Smithfield C, especially in its abundance of small scrapers of the thumb-nail and horseshoe type. It has been called a *pygmy* industry. The little implements of which it consists, apart from scrapers, are somewhat irregular crescents and other pointed bladelet ends with one edge battered. They appear to resemble Azilian and Tardenoisian pieces. Winged arrow-heads are sometimes found. The *kwe* and the palettes are met with as in the Smithfield industry. The bone industry, relatively developed, comprises chiefly awls, arrow-points of round section, and spatulas. The pottery is very simple, generally with pointed bottoms.

This Wilton industry is met with in caves, in rock-shelters, and in open-air sites. It is certain that it came to an end only at a comparatively recent period, and that it was very much the same as that of the Bushmen at the time of the European invasion.

South African prehistorians compare Smithfield A and B with the Capsian and Aurignacian, and Smithfield C and Wilton with the Upper Capsian, but this parallelism is of value only from the point of view of morphological comparison. Polished stone is unknown in this country except for a few isolated axes, which are rare intrusions from an external source.

Prehistoric Art in South Africa. There are many paintings and rock engravings in the South African zone, including realistic representations of men and animals,

with the figures often grouped in tableaux and showing a very remarkable artistic sense. Particularly admirable are the accuracy of some of the attitudes and the way in which movement is depicted. There are also diagrammatic figures. From the technical point of view it is found that the outlines and even entire surfaces have often been pricked with tiny blows. The painting, though sometimes in ochre of a single colour, is often polychrome, in red, yellow, white, and black.

The fact that these paintings date from different periods is shown by differences of patina, superpositions, and differences of style. The Abbé Breuil distinguishes sixteen pictorial series in the east of the Orange Free State. The earliest of them date, in his opinion, from the Middle Stone Age and consist of figures of extinct animals such as the bubalis and one of the *equidæ*. The latest sometimes represent Europeans, and it is said that the Bush men were still painting on rocks as late as the nineteenth century.

What is the value, or rather the meaning, of the connexion that is possible between South African works of art and those of the European Quaternary? The lack of intermediate links and what we know of the psychological unity of the human genus prevent us from reaching any definite conclusions.

The sequence of industries, which has been established by numerous stratigraphical observations, shows in a striking manner the same principal elements as in Europe: a Lower Palæolithic very similar to ours, an analogous Upper Palæolithic, and a final Stone Age that corresponds to a Mesolithic, passing into Neolithic by such industrial innovations as pottery, but lacking the essential features of the latter culture. We have seen local cases of this kind in Europe in the development of the Tardenoisian,

but it was swept away by a movement of superior civilization. In South Africa, on the other hand, this stage was considerably prolonged, and ended only with the European invasions.

Fossil Hominians and Men in South Africa. A fossil anthropoid whose skull was discovered in 1924 by R. Dart at *Taungs*, in Bechuanaland, has been given the name *Australopithecus africanus*. It resembles the gorilla and the chimpanzee, but has something more human about it.

Other anthropoid remains were discovered in 1936 at *Sterkfontein*, in the Transvaal, by Dr R. Broom, who named the species *Australopithecus transvaalensis*, but after a complementary discovery of a mandible and femur in 1938 Dr Broom changed the name to *Plesianthropus transvaalensis*, to indicate that the being in question was akin to man.

Finally, in the same year and in the same district M. Terblanche found at Kromdraal some fragments —skull and humerus—of another type, called by Broom *Paranthropus robustus*. These two species appear to have assumed the upright (biped) position.

It is thought by the discoverers that these anthropoids should be classed among the ancestors of man. (Every discoverer of a fossil anthropoid is always inclined to adopt such a hypothesis, giving the maximum value to his discovery.) All that can truly be said of them, however, is that they are a series of animal forms akin to the existing African anthropoids but more nearly approaching the human type than any other. As the geological levels to which they belong seem fairly recent, although ill defined (Pleistocene), it is difficult to admit the 'human ancestor' hypothesis. It is more likely that these fossils represent branches, now disappeared, of the phylum to which the gorilla and the chimpanzee belong.

A skull discovered in 1921 at Broken Hill (Rhodesia) and published by S. Woodward as *Homo rhodesiensis* is closely akin to the Neanderthal type but even more robust and bestial. An incomplete skull found at Boskop (Transvaal) tends to resemble at the same time certain Neanderthal, Cro-Magnon, and negroid types.

CHAPTER II

EURASIA

THE vast continent of which Europe forms the western extremity seems to have played the principal part throughout the history of the human race, but apart from Europe the whole area is unfortunately very little known—even less than Africa—from the prehistoric aspect. We shall have to content ourselves here with sketching the outlines of the studies to be made and indicating some of the principal results of sporadic researches.

DIVISION INTO ARCHÆOLOGICAL PROVINCES

It is a recognized fact that political, cultural, and even racial divisions have varied in the course of history. There is every reason to believe that it was the same in the course of prehistory, and it would therefore be necessary to draw a map of archæological provinces for each epoch. We are far from being able to do this, but there are a few great continental divisions marked out by nature—soil and climate—which appear to have been always of importance for human grouping, and these we can take provisionally as an outline for purposes of study.

We can say, to begin with, that the western extremity of the continent, this Europe of ours, whose importance has been exaggerated by a kind of optical illusion, seems actually to have played a part in prehistory out of all proportion to its area. The abundance of ancient remains, the development of the industries and of art, bear witness to this. The importance of this zone, once overestimated, must not now be underestimated, favoured as it is by its

temperate climate and the existence of seas and rivers well suited for purposes of communication.

In Asia proper we shall distinguish four great zones:

(1) The *Northern* or arctic zone, covering the whole of Northern Asia, consisting largely of frozen steppes, and unified chiefly by its climate.

(2) The *North Central* zone, consisting of plains continuous with those of Central Europe and stretching right across Asia as far as Manchuria. It is a zone of easy communications, despite the Gobi desert, for the surface has no strong relief and is largely covered by herbaceous vegetation. It is the "empire of the steppes," historically realized by Genghis Khan.

(3) The *East Central* zone, consisting primarily of Tibet and China. Very extensive, compact in shape, and isolated by enormous mountain ranges, it has been able at certain periods to retire within itself and work, as it were, in a retort.

(4) The *Southern* zone. This is deeply indented by the sea and clearly divided into three great regions—Hither Asia and Iran, India, and Indo-China and Malaya.

I. **Northern Zone.** The prehistory of this zone is, so to speak, unknown, but its ethnography is of particular interest to the prehistorian. To begin with, we notice a remarkable unity of culture as well as racial similarities among the peoples occupying this immense area. The unity of the Northern zone overleaps continental boundaries and establishes a connexion between the continents. Just as in the west the Samoyeds occupy lands in both Europe and Asia, so on the eastern side there is the connexion made between Asia and America by the Asiatic Eskimos (Namollo or You-ite), the Aleuts, and the Alaskan Eskimos. The 'hyperboreans' have found it easy to pass into America at places where the continents

approach each other—the Aleutian Islands and the Behring Strait. In each continent, too, they have receded and are still receding northward, driven by more numerous and stronger peoples. Just as the early Lapp industry in polished schist, called 'arctic,' is met with in prehistoric form as far as the south of Norway, so on the coast of the land of the Tchuktchis have been found traces of the dwellings of Asiatic Eskimos who are confined to-day to the islands of the Behring Sea, and implements have been dug up in the State of New York resembling those of the Eskimos of Greenland.

Again, prehistorians have long been struck by the resemblances in industry and mode of life between the hyperboreans of to-day and the men of the Reindeer Age in our part of the world. Some have gone so far as to say that it indicates a survival pure and simple of the Magdalenians who went northward in the wake of the reindeer. Professor Sollas, after endeavouring to establish parallels between the "ancient hunters" and existing peoples, called to his aid the resemblance between the Chancelade skull and that of an Eskimo (see p. 136) to draw the conclusion that the man in question was a real Eskimo living in the south of France during the Magdalenian period.

Without our going so far as to admit the connexion between Eskimos and Magdalenians it would seem legitimate to make use of the documents of hyperborean ethnography to explain certain remains of the material culture of the Reindeer Age. The similar mode of life and probably also actual cultural survivals have established very visible bonds between the two: there was the same hunter's life, with the reindeer or a kindred species for its chief and almost only quarry; there was the importance of bone and horn for making implements

and weapons, and a resemblance between some of the things made; there was the use of stone lamps, and so forth. But, to be strictly fair, there are equally striking differences to be noted as well as resemblances: in late hyperborean industries polished stone plays a large part, with shapes unknown to the Palæolithic; Eskimo art, of which some sources, at least, appear to be very recent, does not show any close resemblance to that of the Quaternary cave-dwellers; and the shapes of the dwellings show many differences. Comparisons between the two cultures as a whole, therefore, cannot be summed up by a crude conclusion that they were generally identical. But, taken in detail and subjected to the necessary criticism, they still possess real value.

II. **North Central Zone.** This zone, the middle part of which consists of steppes, seems to have had throughout the ages, if not a real cultural unity, at least a connecting function between peoples very far apart. Thus cultural influences and commercial exchanges were propagated in the north, as they were in the south, by way of the shores of the Mediterranean. The nomadic 'peoples of the steppe' played a similar part to that of sailors engaged in foreign trade, known as 'peoples of the sea,' and they extended their activities over even greater distances. It seems now that in the Bronze Age the Far East had relations with North and Central Europe through the partly nomadic peoples of Siberia, as is shown by artistic and technical peculiarities. For instance, the same pottery ornamentation by polychrome painting, with single, double, or recurring spirals, is found from Rumania to China. Scandinavian archæologists have noted also the resemblance between vessels with incised ornament in China and those of their own country. Socketed axe-hammers, some in bronze and others copied from them

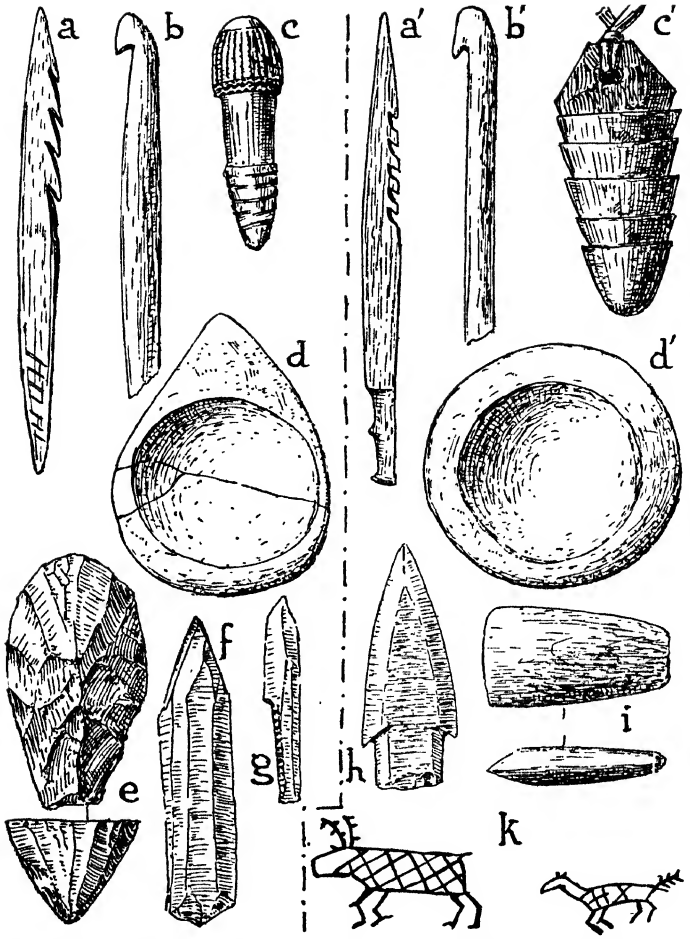

FIG. 38. EXAMPLES OF RESEMBLANCES AND DIFFERENCES BETWEEN THE INDUSTRIES OF THE EUROPEAN REINDEER AGE (LEFT) AND MODERN ESKIMOS (RIGHT)

a, *a′*, heads of missiles; *b*, *b′*, throwing-sticks; *c*, *c′*, conical stepped stoppers (used by Eskimos to stop the flow of blood from animals wounded by spears); *d*, *d′*, stone lamps. These are all similar, but the following Magdalenian flint implements have no Eskimo equivalents: [*e*, keeled scraper; *f*, graver; *g*, laterally shouldered bladelet. The Eskimo schist lancehead (*h*) and axe-head (*i*) have no equivalent in the European Reindeer Age. The Eskimo figures of animals (*k*, reindeer pursued by wolf) are scarcely comparable with Quaternary art (*cf.* Fig. 22).

in stone, together with very special shapes and sometimes figures of stylized animals, are scattered throughout Siberia, Central Europe, and Scandinavia. Innumerable finds since the eighteenth century in the districts of Minusinsk and Krasnoiarsk, near Mongolia, attest a great cultural development of that region in the Bronze Age and even at the end of the Neolithic. Mineral wealth seems to be the foundation of this development, whose influence extended so widely.

A certain number of finds that have been thoroughly studied from the upper Danube valley to that of the Don show the existence of an Upper Palæolithic whose main lines at least are comparable with ours. The Willendorf bed in Austria, on the banks of the Danube, consists of several habitation layers at a depth of from 6½ to 26½ feet in the loess. The fauna includes mammoth, reindeer, horse, etc. At the bottom are stone industries very similar to the standard Aurignacian, and at the top the implements include small battered-back pieces as in one level of the Grimaldi caves, and the so-called 'atypic' shouldered points. The bone industry is fairly simple, but the bed has yielded one of the best statuettes of the fat woman type known in France in the Aurignacian. It is called the Venus of Willendorf. (See Fig. 21.)

The Predmost site, in Moravia, is equally famous for its human remains, its extraordinary wealth of stone industry, and above all its mammoth bones. The remains of more than a thousand of these elephants have been found there. The industry includes types entirely similar to those of the Middle Aurignacian: numerous gravers, keeled scrapers, etc., and double-sided leaves like the Solutrean, but generally coarser and thicker. There may be several levels that it has not yet been possible to isolate. It is more probably a variety which it is difficult to

synchronize precisely with the standard subdivisions established in a small area of Western Europe.

It has been possible in some cases to assert that industries belonging obviously to the Upper Palæolithic group were assignable to a more recent period, and they were then called *Epipalæolithic*. But as it is a matter of local survivals corresponding to phenomena of retardation

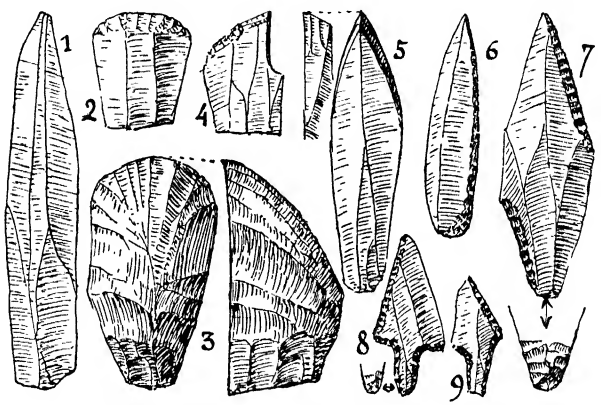

FIG. 39. CHWALIBOGOWICIAN INDUSTRY (POLISH MESOLITHIC)
1, blade; 2, scraper; 3, keeled scraper; 4, angle-graver; 5, *bec-de-flûte* graver; 6, battered-back blade; 7–9, tanged points.

during the transitional period called *Mesolithic*, they are classed under the latter name.

Thus in Poland in sandy formations made by the wind on the moraines of the last glaciation and lying beneath a bed of humus (itself covered by later dunes) which seems to belong to the warm damp period called 'Atlantic'—the period of the *Littorina Sea*—there is found an industry called *Chwalibogowician*, from the name of a village north of Cracow where it was first studied. This industry includes blades, scrapers, and gravers of types prevalent at all levels of the Upper Palæolithic;

thick or keeled scrapers like those of the Middle Aurignacian; battered-back blades of the La Gravette type and others with the Solutrean retouching; and, finally and above all, tanged points, wide or tapering, in the Font-Robert style.

We may here note in passing a good example of the difficulties in the way of typological research when it aims at great precision. This Chwalibogowician, classed as Mesolithic according to the date indicated by geology,

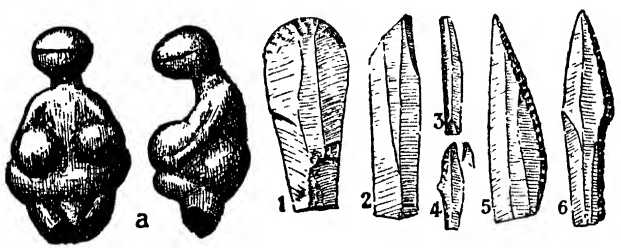

FIG. 40. RUSSIAN AURIGNACIAN INDUSTRY

a, The Venus of Gagarino; 1, scraper; 2, graver; 3–6, bladelets and points with steep retouches. (Gagarino, valley of the Don.)

is typologically a real Upper Palæolithic. It contains types of various levels, as is the case with the Magdalenian.

Various sites in Poland and Russia mark the line of the Upper Palæolithic as far as the plains of the Don. Recent excavations there have disinterred at Gagarino the remains of habitations resembling pit-dwellings surrounded by stone slabs and mammoth tusks. The stone industry—gravers, scrapers, and 'atypic' shouldered points—and several ivory statuettes, especially one called the Venus of Gagarino, are again entirely similar to the classic elements of our Aurignacian. Finally, in Eastern Siberia, near Irkutsk, the discovery has been made in the small Malta bed of a certain number of works of art

including half a score of female statuettes, always of similar type and associated with an Aurignacian industry.

These facts reveal the enormous area covered by a remarkably homogeneous Upper Palæolithic.

Similarly (or even better) there is found throughout the whole zone a Palæolithic resembling the Mousterian of the west. It seems, however, that this flake industry, whose chief types are the ogival point and the side-scraper, represents in most of Asia and Central Europe not only the Middle Palæolithic, in which the reindeer appears in our climates, but also the Lower Palæolithic, interglacial with a warm fauna, including *Elephas antiquus* and *Rhinoceros Merckii*. This is shown particularly by the celebrated finds at Taubach and Ehringsdorf, in the neighbourhood of Weimar.

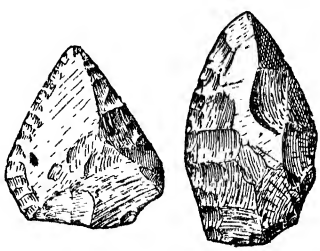

FIG. 41. POINT AND SIDE-SCRAPER OF MOUSTERIAN TYPE, FROM ALFONTOVA, NEAR KRASNOIARSK (SIBERIA)

At Alfontova-Gora, near Krasnoiarsk (Siberia), on the Yenisei, Savenkov and de Baye found at the base of the loess, associated with reindeer and mammoth bones, an industry of large flakes, with ogival points, side-scrapers, and discs, entirely resembling the Mousterian found at the same level in Northern France.

III. **East Central Zone** (Tibet and China). This zone is not at all well known, but a few outstanding discoveries have been made in it.

To begin with, there is that of a creature morphologically intermediate between man and the present-day large anthropoids. (The original discovery was made by O. Zdansky: further research by D. Black, Teilhard de

Chardin, Weidenreich, Peï, etc.) The vast winding clefts in the chalky hills of Choukoutien, in the Peking district, contain a filling of debris and red and yellow earths that seem to belong to a formation lying beneath the great loess (see p. 193). In this filling several bone-bearing levels and hearths have been discovered. The fauna appears to be much the same throughout the entire thickness of the deposit, with *Rhinoceros sinensis*, *Machairodus*, hyena, the massively built *Euryceros* deer, and so forth —a fauna clearly related to that of the Upper Pliocene, called *Nihowan*, and lacking, on the other hand, all the characteristic forms of the yellow loess. The industry consists of quartz flakes obtained by breaking the cores between two stones; few of the pieces are retouched, and they are all very coarse, owing largely to the difficulty of working the material. Along with this fauna and industry several skulls have been found, more or less damaged, belonging to a species made by D. Black into *Sinanthropus pekinensis*. Their capacity seems to vary between 55 and 73 cubic inches, as compared with 24 to 37 for the anthropomorphous apes and 79 to 98 for modern man. *Sinanthropus* is a very near relation of the *Pithecanthropus* of Java (see p. 214) and, to judge by a whole series of morphological features of the skull, it is situated just about half-way between an anthropoid like the gibbon and a Neanderthal man.

The question arises whether the industry and the hearths contemporary with *Sinanthropus* were the work of that creature or whether the latter was merely an animal hunted by man. If *Sinanthropus* was the maker of the quartz implements, then the definition of man as *faber*, the only tool-maker, no longer holds good. It may be remarked, also, that the very coarse quartz industries carried on down to our own day by races of *Homo sapiens*

in Oceania show how illusory it is to seek in the stone industries for the degree of development of its makers. But what proof is there that *Sinanthropus* is the author of the implements found at Choukoutien? Its bones, it will be said, are associated with the implements and no trace of man has been found. But that is most frequently the case in Quaternary caves: there are finds of human industry and animal bones without human bones. Moreover, two objections have been made to the idea that *Sinanthropus* was the master of the hearths. The first is that his long bones have not been discovered, but only skulls, as if they were trophies. To this the more or less convincing reply is made that the long bones may have been broken and have easily passed unrecognized among the animal bones. (No one has gone so far as to postulate a sinanthropic funeral rite preserving only the head of the deceased.) Moreover, in 1938 the discovery was at last made of some fragments of humerus, radius, and femur attributable to *Sinanthropus*, but they remain exceptional. The second objection is that *Sinanthropus* is too near to the ape, and its brain too little developed for it to have been able to discover fire and to make tools. The reply is that this is an unproved statement and begs the question. On the whole, as there are no solid arguments on either side, the scientific attitude is to refrain from drawing conclusions. If the exclusive association of *Sinanthropus* with the Choukoutien industry is again found a certain number of times, as in the case of Neanderthal man and the Mousterian industry, it will be possible to regard the point as proved.

Above the red earth formation, to which the Choukoutien bed belongs, lies the yellow loess, the 'great loess' of China, an extraordinarily widespread and homogeneous formation containing everywhere the same fauna, and

called by Father Teilhard de Chardin "the *Rhinoceros tichorhinus* and *Struthiolithus* Quaternary." It extends from the south of the Ordos to Baikal, and appears to join on to the loess of Siberia and Russian Turkestan without any particular interruption. The fauna is remarkable for the great number of species that have disappeared, and for its affinities with the European Quaternary.

At different places, in the basin of the Chientang river and in the Ordos, Father Teilhard de Chardin has found

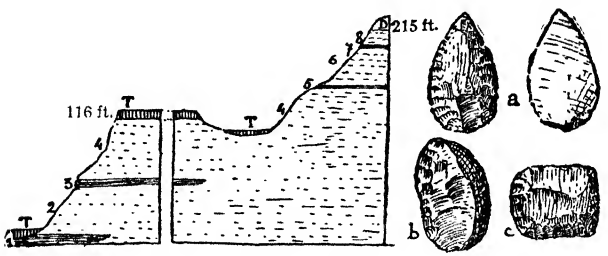

FIG. 42. SECTION OF THE QUATERNARY AT SJARA-OSSO-GOL

1, 3, 5, 7, lacustrine beds intercalated in the loess; *T*, terraces of recent loam. Industry found at the base of the loess: *a*, point; *b*, side-scraper; *c*, rectangular implement.

near the bottom of this loess, which is sometimes enormously thick, hearths or traces of ancient soils with remains of stone industry. In the valley of the Sjara-Osso-Gol, a veritable cañon that cuts the Ordos plateau to a depth of 230 feet, the industry is met with 23 feet above the bottom of the loess and some 200 feet below the top. It includes points and side-scrapers, but they are small, for the local raw material is confined to small pebbles.

The Upper Palæolithic and Mesolithic are still practically unknown in China. This does not prove that they are non-existent, but it may be presumed that they were not greatly developed in that country. Dr Nelson,

however, found a small stone industry in the Western Gobi, under the consolidated dunes, with ostrich egg-shell ornaments and without pottery, reminiscent of the Azilian.

If the enormous thickness of the loess appears barren, its surface, transformed into lehm or into vegetable earth, contains traces of a very rich Neolithic civilization. In Manchuria the loess is covered in places (far inland) by a layer of black earth, itself covered by sandy dunes. This black earth contains an industry characterized by fine and regular blades made from root-shaped cores (*cf.* Fig. 8, Nos. 3, 4, and 5) and small grinding-stones. This industry in conjunction with a somewhat simple kind of pottery forms what Father Teilhard de Chardin calls the *Mongol Neolithic*. At the bottom of the black earth Professor S. Tokunaga has discovered near Harbin an industry also comprising fine blades but no pottery, and associated with a *Rhinoceros tichorhinus* fauna. According to Father Teilhard de Chardin, this (if the facts are correct) would be a Mesolithic industry from which the succeeding Neolithic was more or less derived, and a local survival of a Pleistocene fauna. (In the same way the celebrated finds of frozen mammoths in Siberia seem to indicate that these animals, having disappeared from Europe with the Palæolithic, remained till a comparatively recent period in the north of Eastern Asia.)

If the Mongol Neolithic seems thus to have had ancient roots in the Mesolithic it also continued till a late date. In Eastern Mongolia M. Tarii found remains of the dwellings and industry of the ancient Tong-Hou, a people described by Chinese writers as fierce barbarians and incorrigible thieves. Their dwellings were grouped within enclosures protected by earthen banks and ditches. Their industry is a curious mixture. On the one hand there is

a complete Neolithic equipment of cut or polished axes, flint blades and arrow-heads, schist knives with eyelet-holes, bone implements, and pottery including coarse types in brown paste and fine ones in grey, well baked and decorated. In association with these are found numerous bronze objects, weapons, iron belt-buckles, and even iron slag, indicating the existence of a local iron metallurgical industry. The bronze objects were importations from China, belonging, to judge from their ornamentation, to the Han dynasty—*i.e.*, about the beginning of the Christian era.

Facts of a similar kind have been observed in rubbish mounds in the neighbourhood of Port Arthur and in Korea. They agree with what Chinese annals relate of the military expeditions of the Han against the barbarian chieftains of the north. The latter no doubt procured their metal arms and ornaments by trade channels, while the common people retained their Neolithic equipment. In these surroundings the Chinese conquerors set up colonial posts under military government like the Europeans in Africa to-day, leading to a juxtaposition of civilization and barbarism and a mixture of objects. We can even get an idea, however small and feeble, of what took place on the ancient Chinese frontiers by observing much farther north the condition of the Tchuktchi tribes of North-east Siberia, described by Nordenskjold as "still living at the same time in the Stone Age and in the Age of Metals."

Alongside this late Neolithic in the vast area on the northern frontiers of China proper are found traces of a real Chinese Neolithic to the south of the Yellow River. Our best information is due to the excavations of Andersson in Honan (Yang-Shao site) and in Kansu. At Yang-Shao thick Neolithic deposits have yielded an

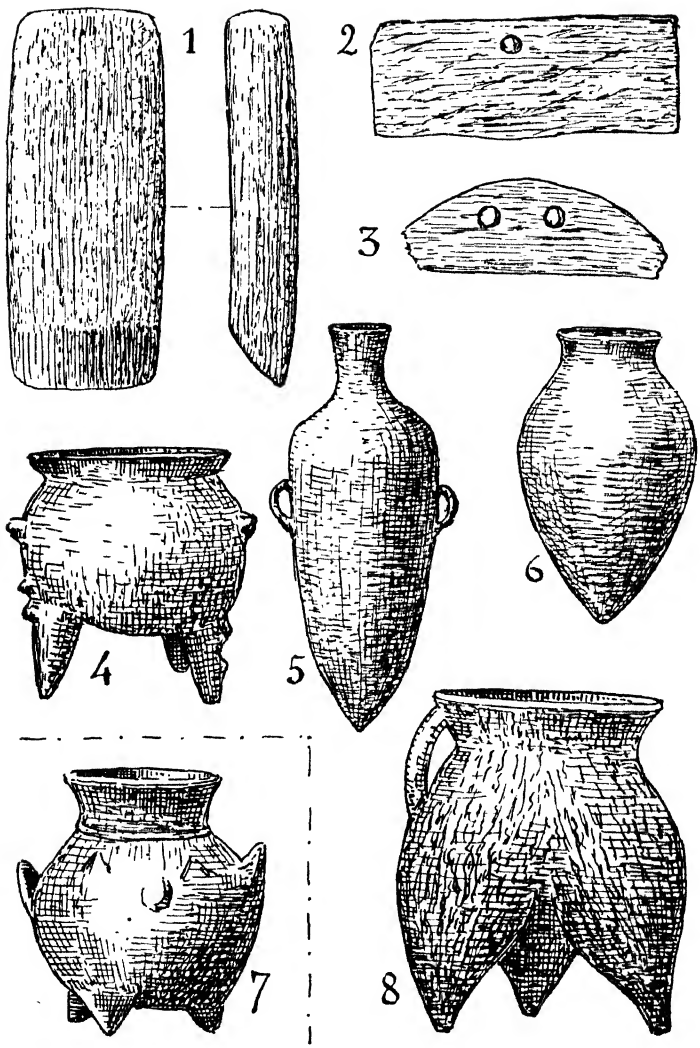

FIG. 43. CHINESE NEOLITHIC OF YANG-SHAO

1, polished axe (or adze) in green stone; 2, 3, polished schist knives with eyelet-holes; 4, tripod vessel of *ting* type, 5, 6, amphoræ with pointed base; 8, tripod vessel of *li* type; 7, tripod vessel from Hissarlik, Asia Minor (Ancient Troy I), for comparison.

industry consisting essentially of polished stone with axes, adzes, or chisels of green stone, schist knives with eyelet-holes and arrow-heads (the latter sometimes also of bone or shell), rings and spindle-whorls of various kinds of stone, and a few rare grinding-stones with pestles in the form of rollers. In contrast to the Mongol Neolithic this industry contains hardly any flaked stones. Besides these characteristics the great development of pottery should be particularly noticed: at this period the Middle Empire was the land of pottery. Along with common vessels made by hand is found a fine and resonant pottery, red in colour, often painted in black and white, and machine-turned. The shapes are varied and graceful, but there are two that predominate—the amphora with pointed base, and the tripod. Of the latter there are two types—the *ting* and the *li*. The *ting* is a kind of cup supported by three small and massive feet made by a method common in Asia Minor (Ancient Troy, level I). The *li* is a vessel whose base is divided into three breast-shaped lobes: it seems specifically Chinese in origin, making it a good fossil to reveal the influence of Chinese civilization in distant lands.

The Neolithic in China, just as in Europe and the Near East, passes gradually into the Bronze Age. The latter had a splendid protohistoric flowering-time during the second millennium. At *Anyang*, in Honan, there have recently been found, in association with richly decorated bronzes, inscriptions on ivory and shell dating from the Shang or Yin dynasty, *i.e.*, the first half of the second millennium before our era. The end of the Neolithic and the beginning of the Bronze Age, for which there exist no such inscriptions, and of which layers have been found situated stratigraphically below the Anyang level, falls therefore in the period immediately preceding, say

in the third millennium, as in the Eastern Mediterranean basin.

We have seen that relations definitely existed, in art and especially pottery, between China and Central and Nordic Europe, which at this period were somewhat backward. In this case the direction of the influence must have been from east to west. But it is probable that Hither Asia and Mesopotamia, where the use of metals underwent an early development, acted, as we shall see later, through Iran and India, on the great cultural centre of the Far East, the connexion being made in particular by Iran and Turkestan, the route becoming famous in consequence as the Silk Road. China, while thus subject to the influence of Western Asia, must in turn have influenced the west, though in a more northerly direction —the 'Far West' of the continent—through the medium of the 'Peoples of the Steppe.'

In another direction also Chinese civilization seems to have radiated as far as Oceania and America. There is, for instance, the similarity between the stone hoes of China and those of North America, and the ovate knives with two holes in the Chinese Neolithic, the Eskimo *ulus*, and similar pieces in Oceania. So, also, resemblances have been remarked in shape and characteristic decoration between the pottery of China and that of Central America. The decoration consisting in square or triangular spirals with rounded angles, which found its finest expression in the beautiful Chinese Bronze Age, under the Chow dynasty, is clearly akin to the art of South-east New Guinea, New Zealand, the Marquesas Islands, and some parts of Central and North America (*e.g.*, among the Mayas, the Eskimos, and the Canadian Indians). Thus the civilization that began in the Neolithic period and blossomed in the Bronze Age in China seems

to have spread its influence very far afield. It is to be hoped that the study of it will be particularly fruitful.

IV. **Southern Zone.** (*A*) **From the Mediterranean to India.** Most of this zone is still unknown in its prehistoric aspect. But it is of considerable interest, for owing to various factors this meeting-place of the continents has been the foundation of our Mediterranean civilizations. These factors include its favourable climate, the development of a flora and fauna which it enjoyed for a long time before its present-day destruction, and the very important part played at the beginning of historic times by its western portion—Hither Asia, Phœnicia, and Mesopotamia—owing to its connexion with Egypt and Europe in the preceding period. Its eastern part—Persia—is also so placed as to be a meeting ground for Indian and Mediterranean influences, as it has been in historic times.

In the present state of our knowledge two regions attract particular attention: Palestine and Mesopotamia.

Palestine has for some years been the scene of systematic investigations, especially by the British School of Archæology in Jerusalem, as well as by Neuville, Stékélis, and others.

As early as 1897 and 1900 the work of Zumoffen had shown the existence in Palestine of a Chelleo-Acheulian industry, of a Middle Palæolithic (Adlun cave, south of Beirut), of an Upper Palæolithic (in various caves, particularly that of Antilyas, near Beirut), with an abundant fauna of animals that have now disappeared or migrated (bubalis, various *cervidæ*, ibex, etc.), and finally of Neolithic.

Recent researches have shown a remarkable parallelism between the Early and Middle Palæolithic industries in Palestine and those in the French deposits. In the cave

of Oumm Qatafa M. Neuville found at the bottom a flake industry resembling the Tayacian of La Micoque, above which is an Acheulian level with a very fine industry and a Pleistocene fauna (*Rhinoceros Merckii*). This fauna in Palestine contains also hippopotamus, cave lion, some kind of deer (? *elaphus*), fallow deer, camel, etc.

Half a score of human skeletons of the Mousterian period have been produced by the discoveries of Turville-Petre in the cave of Zuttiyeh (Galilee) in 1922, and above all those of T. D. McCown in the cave of Es-Skhul (Mount Carmel) in 1932 and of Miss Garrod in a neighbouring cave (Et-Tabun). They are roughly similar to Neanderthal man but most of them show 'neoanthropic' characteristics—*i.e.*, characteristics approaching *Homo sapiens*: the cranial vault is relatively lofty, the chin well formed, the limbs longer. Some have wanted to make a genus and species of these men—*Palæoanthropus palestinus*—but they are regarded by many as a link joining *Homo neanderthalensis* to *Homo sapiens*. It is to be noted that the Et-Tabun skull differs from the rest in the absence of chin and the apelike appearance of the jaw.

The Upper Palæolithic is represented in Palestine by blade industries more or less comparable to those of Europe and to the Capsian. Bone work is confined to a few points. The fauna apparently no longer includes the rhinoceros or hippopotamus, but there remain some elements, such as *Cervus elaphus*, fallow deer, brown bear (*Ursus arctos*), and wolf, which indicate a more wooded country and a wetter climate than nowadays.

Neanderthaloid man has been replaced by a *Homo sapiens*, inadequately known but apparently of somewhat primitive type. The forehead is wide and sloping, the nose high, the chin prominent, and the jaws show no prognathism.

Next followed a period called Mesolithic, with an industry containing neither polished stone nor pottery, but abundant microlithic elements: battered-back bladelets, segments of circles, and micro-gravers, together with blade implements—scrapers, angle-gravers, and borers. The whole bears a fairly close resemblance to a developed Capsian. Miss Garrod, who discovered this industry in the cave of Shuqbah on the Wadi-en-Natuf, has given it the name *Natufian.*

Four subdivisions, based on certain details, are now made in this period. The period is of great interest from two points of view. In the first place it has yielded works of art—sculpture in the round on bone and stone in a naturalistic style—very similar to those of the Upper Palæolithic in Europe, and it is the only Palestinian culture of which this can be said. Secondly, and perhaps more particularly, there appear sickles fitted with pieces of flint whose cutting-edges are polished by use. Most of the rest has disappeared, being no doubt made of wood, but some bone ones have survived, and they are of the straight kind with tapering handle and large head that is met with in the Egyptian Neolithic and the cave-dwellings of the west. Moreover, as Palestine is one of the only regions where a variety of wheat—*Triticum dicoccoïdes*—grows wild, it would seem that we have here the origin, or one of the origins, of agriculture. The Natufians, however, did not practise stock-rearing, but remained hunters and fishermen, so they had one of the essential elements of the Neolithic without the others.

Alongside this must be set the fact that the *Neolithic* appears to be missing in Palestine: immediately above the Natufian we find the *Aeneolithic.* Consequently, what has been called Mesolithic seems also to take the place of the Neolithic, and has one of its principal features. It

may actually be the root of one essential element of world Neolithic.

Neuville gives the name *Tahunian* to the first culture in which the use of metal appears and whose stone

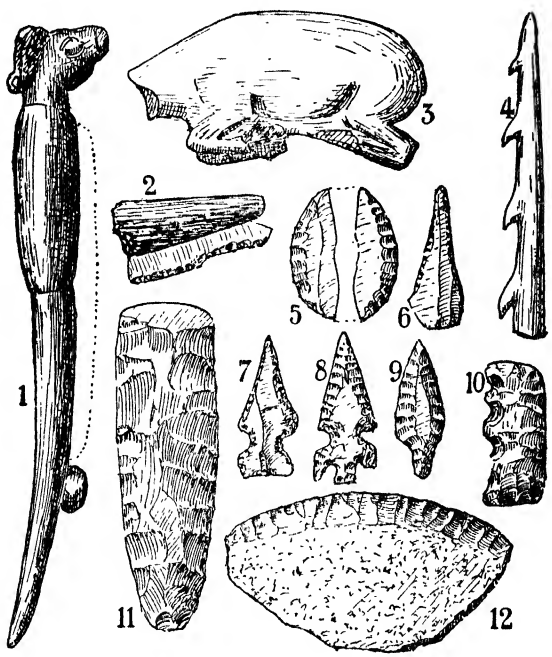

FIG. 44. PREHISTORIC INDUSTRIES OF PALESTINE

1–7, Natufian industry (1, bone sickle-handle; 2, fragment of sickle with flint inserted; 3, statuette of leaping deer; 4, bone harpoon; 5, segment of circle with sloping double-sided retouch; 6, 7, arrow-heads); 8–12, Aeneolithic (8, 9, arrow-heads; 10, toothed sickle-tooth; 11, *tranchet* (or 'chisel'); 12, fan-shaped side-scraper).

industry is closely connected with that of the preceding period. Pottery appears, but the polishing of stones, confined, moreover, to tough stone, comes only in a late phase of the Tahunian. Another Aeneolithic variety,

with flint chisels, *tranchets*, hatchets, sometimes with polished cutting-edges, a highly developed pottery, and a more frequent use of metal, has received the name *Ghassulian*. To this period belong the megalithic monuments so numerous in Transjordania. And, finally, Neuville gives the name *Cananean* to the standard industry of the bottom of the *tells* (heaps of ruins forming the foundations of towns), generally described as Bronze I.

Natufian man is very well known from the remains of over a hundred individuals discovered by Miss Garrod in the caves of Shuqbah and El-Wad. He was a dolichocephalic of short stature and with marked negroid characteristics: wide nose, subnasal prognathism, and only slightly projecting chin. He is obviously different from Upper Palæolithic man. The Aeneolithic and Bronze Age races in Palestine, inadequately known, give us a glimpse of a complicated variety of mixtures.

Mesopotamia played a leading part at the beginning of historic times, and it is therefore of great interest to study the preceding phase, a period of incubation of the great cultural development that followed. The centre of this development appears to have been the southern part of Babylonia—the land of Sumer. Unfortunately this land of recent alluvia not only yields no Upper Palæolithic, but even the Neolithic remains are deeply buried: they can be reached only by borings over a necessarily restricted area, and they have not been able to provide much information. None the less the finds of Neolithic industry at the bottom of the great *tells* show that the origin of the historic towns goes back to this period, and that the development of civilization took place on the spot. In 1927 to 1930 Watelin found on virgin soil at the bottom of the Kish *tell* a bed of hearths with a stone industry containing many microliths of a

massive character that is somewhat peculiar. These hearths are to-day below the water-bearing level. At three different levels Watelin found traces of great inundations, the most important being a deposit of 16 inches situated $5\frac{3}{4}$ feet below the present level of the plain. Similarly Woolley found at Ur a bed of loam reaching a depth of 13 feet which he identified as a relic of the

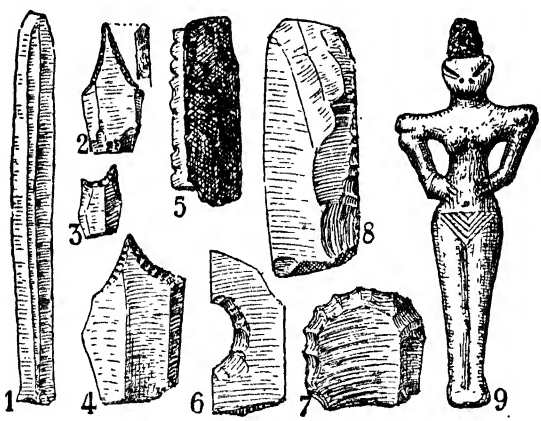

FIG. 45. KISH NEOLITHIC

1, blade; 2, 3, 4, thick points with perpendicular retouches; 5, sickle-tooth with remains of mastic; 6, concave scraper; 7, scraper; 8, rectangular knife; 9, clay statuette (el-Ubeid).

Flood. It is very difficult, however, to accept such an identification in this land, where the shifting of alluvial deposits is so common. But the terrane bears witness to the power of floods at a period later than the building of cities, and the origin of the Babylonian and Biblical tradition seems certain.

The Neolithic level of Kish has not been found again at Ur. The earliest civilization is another Neolithic (or Aeneolithic) variety with painted pottery and statuettes in a distinctive style. Then above some 35 feet of alluvia

appear two levels belonging to the industries already identified at el-Ubeid and Jemdet-Nasr.

The *el-Ubeid* civilization, called also Ur I, shows features which have persisted in succeeding phases, and even to-day some of the Iraqi huts, with their framework of bundles of reeds and their matting partitions, continue the technique of that bygone age. Figurines found in the tombs resemble modern Kurds in their sheepskin clothing. There again we find continuity with the Neolithic period, despite other influences and invasions.

A Sumerian tradition, recalling the Book of Genesis, speaks of the creative act of "dividing the land from the waters." At Uruk, at el-Ubeid, and at Ur have been found the ancient inhabited soils, veritable islands made artificially by mats or beds of crossed reeds alternating with earth, dung, bitumen, etc. Thus man's first task in these regions must have been that spoken of by tradition —to dry certain parts and canalize the waters. At el-Ubeid there is a stone industry with polished axes, pear-shaped perforated maces, sling stones, triangular arrow-points, sickle-teeth of obsidian or flint, and so forth. Copper appears, at all events at the end, in small objects like harpoons. But the chief peculiarity of the industry lies in the enforced use of clay: everything was scarce or absent except mud and reeds, and the result was a kind of Age of Clay. Walls were made of reeds and *pisé*; clay nails were used to fix the matting; cones of baked earth were embedded in the *pisé* to strengthen it; the art of pottery, besides borrowing its shapes from wicker-work, produced many regular vessels out of clay mixed with straw; and the very sickles were often made of baked earth!

In the following period, that of *Jemdet-Nasr*, where we find beautiful decorated pottery and the use of copper

for fish-hooks, etc., appears the earliest ideographic writing. It was used for keeping accounts, by representing things diagrammatically and giving symbols to the numbers. So the accountant was able to set down his ideas before the poet or the historian.

It appears, also, that the great Mesopotamian civilization originated in a similar way to that of the Nile, by human concentration in a region which necessitated great co-operative works, so that organization and division of labour arose. Stages of development in Sumer and in Egypt appear also to correspond, Jemdet-Nasr being equivalent to the protodynastic period, and the archaic Sumerian to that of Dynasties II to V.

Attempts have often been made to discover what influences Mesopotamia and Egypt could have had on each other, and the problem seems difficult. But, as O. G. S. Crawford has remarked, there is an enormous gap in our knowledge, causing us grave embarrassment: *Arabia*—both Arabia Felix and Stony Arabia, though the latter was no doubt *felix* also at the beginning of the Holocene—must have played an important part in this primitive phase, and we have no documents from this source.

Iran. Connected archæologically with Mesopotamia is the land of Susiana or Elam, where for forty years the French mission, directed first by J. de Morgan and then by R. de Mecquenem, has made such fruitful excavations in the *tell* of Susa. The plateau of Iran itself was influenced by this great cultural centre, and tablets bearing cuneiform inscriptions and dating from the thirtieth century B.C. have been found between Teheran and Ispahan.

The region to the north of Persia seems to have been connected with Asia Minor on the one hand and with India on the other.

(*B*) **India.** This vast country, teeming with human races, seems to have been since the Tertiary period a favoured abode of the primates. At the foot of the Himalayas stretches a fringe of erosion debris stripped from the mountains and then itself raised by later foldings: these are the Siwalik Hills. In them have been found, among vertebrate faunas of dates ranging from Miocene to Upper Pliocene, numerous species of apes. One kind, the *Dryopithecus*, with many varieties—some of which are connected with the chimpanzee and the gorilla, and others, at least in the matter of dentition, with man—appears to some palæontologists to be "an ancestral and synthetic form" (Boule). *Palæosimia*, *Palæopithecus*, and *Sivapithecus* are races of primates which may be ancestors or near collaterals of the orang-outangs, gorillas, and higher hominians. M. Pelgrin, judging from the very human appearance of the dentition of *Sivapithecus*, places the latter in the direct line of ascent of the hominians. Documentary evidence is still too incomplete to allow us to establish pedigrees, but the existence of abundant stocks of simians at the end of the Tertiary in India is an important fact to be noted.

In the prehistoric sphere the existence of double-sides of Chelleo-Acheulian type has long been known near Madras and in the basins of the Kistna and Godaveri. Quartzite implements are found at Madras in a laterite associated with beds of gravel at a level of some 300 to 325 feet. These resemble those met with in Europe and Africa in shape and even in the condition of the deposits.

Recent researches (1935–37) have enabled de Terra, Paterson, and Teilhard de Chardin to find an Early Palæolithic stratification in the alluvia of the upper Indus valley, which blend with the Himalaya moraines. Five glacial cycles can be distinguished in the Himalayas, of

which the first three are the most important. The formations of the First Glaciation contain a Villafranchian fauna and no industry. Those of the Second Glaciation, the boulder conglomerate, contain flakes of quartzite "probably artificial" (?) and, at least in their upper part, in hollows anterior to the Third Glaciation, Chelleo-Acheulian double-sides. The deposits of the Third Glaciation, called the *Potwar* deposits, comprise a gravel base and thick beds of a loess that "recalls, though more distinctly stratified, the loess of China and Europe." In the gravel at the base of the Potwar is found an industry of "large quartzite pebbles broadly retouched (alternate retouches) on a cutting-edge" which has received the name of *Sohan* industry.

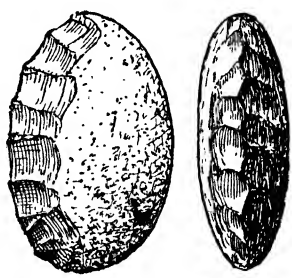

FIG. 46. THE SOHAN INDUSTRY

Pebble with double-sided unilateral cutting-edge.

The same authors have found this industry again in the Nerbudda valley at the base of what is called the *Upper Nerbudda* formation, while, as at Madras and in the Punjab, double-sides of the standard type are found in the *Lower Nerbudda*.

The caves of *Billa Surgam*, in the Karnal, contain thick beds of deposits with several habitation levels. The deepest of them have yielded a fauna of which some species have now disappeared, and an industry of blades and bone implements which some have tried, with more or less correctness, to assimilate to the Magdalenian. After Anderson's discoveries at Chakradharpur Mr Panchanan Mitra called attention in 1927 to stone industries in this region as akin to the Upper Palæolithic, the Azilio-Tardenoisian, and the Capsian. In 1864 there was

discovered at Jubbulpore, in the Central Provinces, an industry of geometrical microliths whose analogues were rediscovered twenty years later in the Tardenois. So, although there are no substantial data as to stratification and fauna, we get a glimpse of the existence of an Upper Palæolithic and a Mesolithic in India. Bruce Foote believed that there was a gap, whereas Panchanan Mitra regards these periods as passing gradually into the Neolithic. According to him the Neolithic in India showed three phases, as follows:

(1) *Banda and Murpha*, an industry corresponding to the oldest Campignian, with 'protocelts,' not polished.

(2) *Bellary*, a long phase of the Robenhausian that passes into the Iron Age. (Pottery *tuyères* for ovens appear in a completely Neolithic bed.)

(3) *Chota-Nagpur and Assam* phase, characterized by the presence of shouldered celts, perfectly polished, such as are found also in Indo-China, and metal implements and weapons of copper, bronze, and iron.

To what extent are these phases chronological and how far are they merely facies? Does the presence of iron as the first metal in the Bellary Neolithic warrant the conclusion that India was in truth "the land of iron" and the country of origin of this metallurgy? Or is it a case, as later in Africa, of zones remaining late in the stone stage and passing suddenly into that of iron? There are many questions to be answered, and it should be noted in this connexion that the vast and varied land of India shows, and seems always to have shown, an amazing juxtaposition of peoples living at very different stages of culture. The Khassias were still erecting megaliths quite recently, and their ethnography is among the best documents we possess for the study of the cultural type characterized by these constructions.

Rock engravings and paintings have been observed in many parts of the peninsula, particularly in the Singanpur caves, where there are paintings representing animals and hunting scenes, the figures partly realistic and partly stylized. "Extraordinary resemblances" have been remarked between these and the paintings of Eastern Spain (*e.g.*, Cogul). But others have stressed the no less extra-

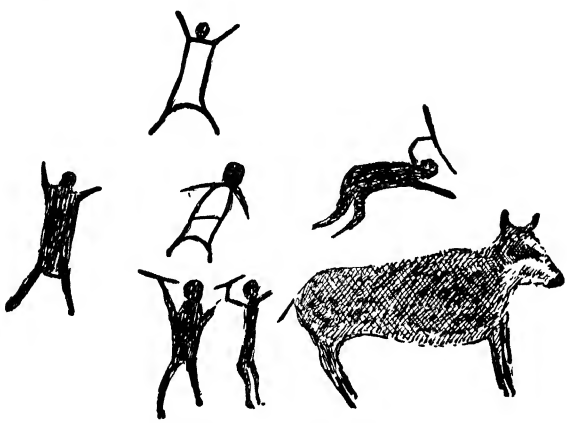

FIG. 47. ROCK PAINTINGS
Singanpur caves (India).

ordinary likeness between the engravings of the same level and the rock engravings of Australia. Are we to connect all these, not excepting the paintings of South Africa, whose similarity to those of Europe has also been considered striking? The simplicity both of inspiration and of methods of execution is a fundamental feature, common to all these primitive arts, so that we should be very cautious and exacting before drawing important conclusions from such resemblances.

Mention should be made, in conclusion, of the great discoveries recently made in the Indus valley, at Harappa

and Mohenjo-Daro, where huge towns dating from the beginning of the Bronze Age have been uncovered, displaying fine stone buildings, well-arranged streets, drains, and so forth. Without going into detail we will merely note the parallelism between this great protometallic civilization on the banks of the Indus and those of Mesopotamia and the Nile that flourished about the same time: each of the three was established in similar conditions on a strip of land watered by a great river, and isolated in the desert or wedged between the desert and the mountains. It may be remarked also that there appears to be some connexion between these three river civilizations, despite this important feature of enforced isolation. It must be said, too, that writing was known to the Mohenjo-Daro civilization, for signs that are apparently ideographic are numerous on various kinds of bronze seals, no doubt for some religious purpose, with large figures of oxen, elephants, and so forth. These signs have been compared by M. de Hévésy to those employed only recently by the inhabitants of Easter Island, and he inferred a common Neolithic origin for the two writings. We should like to have some new and searching investigation to confirm results of such wide scope.

Fig. 48. Bronze Seal with Figure of Ox and Written Signs
Mohenjo-Daro, India.

Another point to be noticed about the Indus discoveries is that it was possible for the extensive relics of such a civilization to remain unnoticed in a country occupied for nearly a century by one of the most archæologically minded of the great nations. What, then, must be the gaps in our knowledge elsewhere?

(*C*) **Indo-China, Malay Archipelago, and Australian Oceania.** The Indo-Chinese peninsula and the Australian part of Oceania, as well as what are ordinarily called the Asiatic archipelagoes, form the end of Asia—an immense mountainous region mainly submerged under the Pacific. This physical unity seems to be accompanied by an archæological unity between divisions which, in respect of human communications, are united rather than separated by the sea. But in this vast unit are endless variety and many forms of life. Almost everything relating to its past has yet to be discovered, but none the less we can indicate here only the broadest outline of what is already known.

On entering this far eastern world of Oceania we are impressed by one chief fact: that one entire portion of this area, condemned to conditions often mediocre or depressing, and far removed from the great aggregations of human beings better placed for working and progressing, has remained culturally stationary. Life remains as it was in prehistoric days, and the prehistorian is compelled in his own interest to turn ethnologist.

He finds first, at the extremity of this region, the *Tasmanians*, the race that has remained most primitive and nearest to Neanderthal man and the anthropoids. In culture and industry they are at the Palæolithic stage, living by hunting, fishing, and fruit-gathering. Their implements are of stone, very similar to the standard Mousterian and some of the Aurignacian, and held directly in the hand without any haft. Their weapons are entirely of wood—the mace and throwing-stick for striking, and the spear and javelin for thrusting. Unfortunately this marvellous living museum that had survived so long was destroyed more than half a century ago by the greed, brutality, and lack of understanding of the white invaders.

Australia, better protected by its size and by nature, still has a primitive race at a Palæolithic stage of culture and with an industry of which some types, such as the axe with polished cutting-edge, are Neolithic. This industry had to make use of intractable and scanty material, though it made up for this inferiority by making handles of wood and gum, and its study is full of suggestions that are useful for the interpretation of prehistoric stone remains.

There was discovered at Talgai (Queensland) a much fossilized skull resembling those of present-day Australian natives, with some intensification of the brutal characteristics. This bears witness, so far as the age of a bone can be judged from its degree of fossilization and the characteristics of a race from a single skull, to the existence at a very remote period of a proto-Australian race which has developed slightly *in situ*.

The island of **Java** supplied the first document in bone to show the existence of a creature morphologically intermediate between the earliest human race (Neanderthal) and the most highly developed existing anthropoids (chimpanzee, etc.). This is the *Pithecanthropus erectus*, discovered at Trinil, on the banks of the Solo, in 1891 by Dr E. Dubois in an ossiferous bed containing many mammals of species differing from those of to-day (elephant and hippopotamus with archaic characteristics, a ruminant of Pliocene type called *Leptobos*, and so forth). It is unfortunately impossible to state precisely the correspondence with the levels studied in Europe and to say whether we have to deal here with the end of the Tertiary or the Quaternary. The great interest of the question lies in determining whether *Pithecanthropus* can have been the ancestor of man or whether it was his contemporary (see p. 25). *Pithecanthropus* is so closely allied to *Sinanthropus* (see p. 192) that Boule regards them at most as

two species of a single genus. To Dubois we owe also the discovery at *Wadjak* of two fossil skulls in which he has found Australian characteristics, but this point is a subject of discussion (von Kœnigswald).

At *Ngandong* several human skulls have been discovered by W. Oppenoorth belonging clearly to the Neanderthal type. He has created for them the subgenus and species *Javanthropus soloensis*, and he thinks there is this local line of descent: *Pithecanthropus*, *Javanthropus*, *Homo wadjakensis* —a hypothesis that Valois considers too bold. But the presence of a Neanderthaloid in Java and the morphological grading mentioned above are at all events very interesting facts.

A Chelleo-Acheulian industry with double-sides (often very thick at the base) and flake implements has recently been found by von Kœnigswald on the fluviatile terraces of the Solo basin, but not in a well-dated bed.

Indo-China appears in the present state of marine contours as the continental root of the world of the Malay Archipelago and Oceania, and must also, it seems, have provided the prehistoric roots for the human settlement of this world. A discovery made by Mansuy and Mlle Colani in the early Neolithic bed of Lang-Cuom (Tonkin) has already yielded a skull of Australian type like those of Wadjak. The same investigators have discovered skulls of Melanesian type in the earliest Neolithic beds of Duong-Thûoc, Khac-Kiem, and Lang-Cuom, in Tonkin. Although documents relating to prehominians have not been found in Indo-China like those of Java or China, nor even remains of Chellean or Mousterian industries, we may yet expect most valuable information from this country, which seems to have been, from its situation and all that we know of it historically and prehistorically, if not a great cultural centre, at all events the junction of

India, China, and the Malay Archipelago. Unfortunately the Indian side—Siam—is almost entirely unknown, and investigations there will be faced by the added difficulty that the finest caves are occupied by organizations of a sacred character. The first surveys of this country, made by Dr F. Sarazin, give hope of great archæological wealth and confirm and extend the results obtained in French Indo-China.

This latter country, which long ago yielded its first documents, has been explored by Mansuy, Patte, and Mlle Colani. Their investigations, dealing with cave-dwellings and open-air sites of the kitchen-midden or shell-mound type, were faced by two main difficulties —viz., the impossibility of making precise stratigraphical observations and the great differences between varieties: it seems that Indo-China has in all ages, as to-day, experienced the juxtaposition of different peoples living at widely varying stages of civilization.

Two main groups of stone industries can be distinguished in Indo-China: a coarse one, comprising the *Hoabinhian* and the *Bacsonian*, and a highly developed one named after the *shouldered celt* (or axe).

The *Bacsonian* industry, defined by Mansuy in 1924 from the Bac-Son bed, east of Tonkin, is met with in caves and shell-mounds. Its essential features are partly imposed on it by the geological character of the country, which is formed of eruptive rocks, so that pebbles of these rocks (rhyolites and diabases) are used instead of flints. The principal implements are made by keeping intact a large part of the pebble, and since these are heavily flaked in tough material they have a somewhat coarse appearance like the Chellean or Campignian. But the retouching often affects only one side of the pebble, When it is applied to both sides and makes a terminal

cutting-edge like that of an axe, this cutting-edge is often sharpened by grinding (or 'polished,' as it is called). This produces an axe identical with the existing Australian type, which has a wooden haft bent round the stone and secured by mastic (*cf.* Figs. 49, No. 3, and 51, Nos. 3 and 4). This outfit is completed by crude flakes, and is often found in association with stones of problematical purpose, but apparently very typical of the Bacsonian

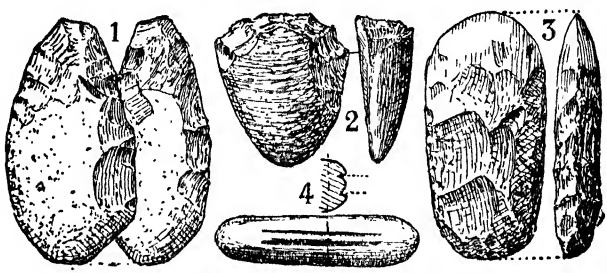

FIG. 49. STONE INDUSTRIES OF INDO-CHINA

1, 2, Hoabinhian cut pebbles (1, narrow-ended double-sided; 2, large scraper or adze chipped on one side); 3, Bacsonian axe; 4, pebble with bifid impression (Bacsonian).

—small pebbles or fragments of rather soft rock, generally schist or sandstone, with their surface hollowed in one or two places by parallel furrows, forming, as it were, a little semicircular moulding pressed into the stone. These have been called 'bifid impressions' (Fig. 49).

Hoabinhian is the name given by Mlle Colani to the industries of the Hoabinh province, west of Tonkin. This author distinguishes three levels, as follows:

(*a*) Lower Hoabinhian, described as Palæolithic and characterized by the utilization of natural forms carried to an extreme, the single-sided cutting of the pebbles, and the absence of pottery.

(*b*) Middle Hoabinhian, in which appear pieces of

perfectly elliptical shape, almond-shaped axes, and polished axes made simply from pebbles, but still no pottery.

(*c*) Upper Hoabinhian, containing microlithic implements, scrapers and borers, and pottery.

This classification has been criticized by Patte, who calls attention to the absence of true stratigraphical data, the existence of coarse pieces in all the levels, and the absence of microlithic industry in the third level in certain beds, such as that of Da But. He regards the Hoabinhian as merely a variety of Bacsonian.

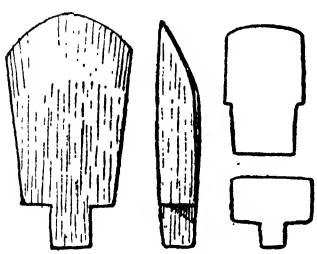

FIG. 50. TYPES OF SHOULDERED CELT

Industries of this kind have been found in Annam, Laos, Siam, Malacca, Borneo, and the Philippines (discoveries of Van Stein Callenfels and Ivor Evans), and the Bacsonian axe is still in use in Australia, as we have said.

'*Shouldered celt*' *Neolithic.* This industry is characterized by this special kind of implement and the apparently complete absence of all other implements. The latter feature has led to much surprise, but it should be noted that there are many varieties of shouldered axe or celt—large and small, short and elongated, with square section and otherwise, with cutting-edge flat, straight, curved, convex, and so forth. There are, in fact, various implements with the same general appearance. Moreover, it may be that weapons in these countries were made of wood, particularly bamboo. Modern ethnographical examples from the Malay Archipelago and New Guinea show the use of bamboo for making arrows, spears, and even knives that are excellent for many purposes. The range of implements was no

doubt completed by fragments of shell and ends of quartz that are not collected because they seem shapeless. Very clear indications in regard to this are provided by the Andaman Islands and Oceania.

The somewhat surprising shape of the shouldered celts seems to be copied from metal types. In the Samrong-Sen shell-mound, in Cambodia, only shouldered celts have been found in conjunction with bronze implements and highly developed pottery, decorated with lines or painted. At Dong-Son, in surroundings of the Han period (*i.e.*, about the beginning of our era), objects of schist, chipped and partly polished, as well as a shouldered celt, have been found along with bronze and a little iron. This may be a local survival, but it implies a not very remote date for the use of stone in the neighbouring regions.

The shouldered celt, as we have seen, is found in the Neolithic of Eastern India—Chota Nagpur and Assam. It has been met with as a fossil in the Malay Archipelago, Japan, and Korea, and it is still in use, with slight variations, in Polynesia.

CHAPTER III

OCEANIA AND AMERICA

We have had cause already to speak of these two continents in studying Eurasia, for the northern part of the latter led us to refer to the northern part of America, and in a similar manner the great Oceanian masses have come to our notice as bound up prehistorically with the Malay Archipelago and Indo-China. It may be said in passing that Japan also seems in ancient times to have been connected with this group and not with China. No Palæolithic is definitely known to exist in Japan, but the Neolithic is very abundant in the rubbish-mounds called *kaizuka* (*kaï* = shell; *tsuka* = mound). Besides the shells of molluscs there are found fish-bones, bones of mammals including the pig and the dog, chipped flints including many arrow-heads, polished stones, schist axes and knives with eyelet-holes, and a quantity of pottery.

Other habitations, whose remains appear to be those of deeply dug pit-dwellings, called *tate ana* (vertical holes), are plentiful in the north (Northern Hondo, etc). Some have considered them to be the dwellings of the ancient Ainus, and therefore regard them as showing the expansion of these people before they were gradually driven back into Yezo and Sakhalin. But this semi-subterranean mode of life is not a racial characteristic and was found on the Continent at a recent period. The presence in Japan of dolmens like those of India and Oceania, whereas there are none in China and those of Korea are of a different kind; the practice of tattooing; the building of light reed dwellings, scarcely suited to a fairly cold climate—all

this, it has been said, points to influences from the south. But it has been pointed out that some elements, such as pottery, knives with holes for fastenings, etc., are akin to those of the Aleutian Islands and the lands of the Arctic. Prehistoric Japan would seem, on the whole, to have been connected rather with the peoples of the sea than with the continental Chinese group.

But if maritime connexions have given the archipelago a certain unity, its division into compartments, as it were, both by the sea and by mountains, has led to provincial particularisms which complicate its archæology in matters of detail. If in early days it received no contributions from Chinese culture and was subject to southern influences by way of the sea, it seems also to have had relations with the continent by the nearest way—the Korean peninsula. Its Arctic resemblances are also resemblances to the Mongol Neolithic, and, broadly speaking, its development seems similar to that of the peoples of Manchuria and Mongolia who remained at the Neolithic stage until "the civilizing virtue of the monarch," spoken of by the sages of ancient China, came to influence it. This hardly happened until the time of the great expansion of the Han power, about the beginning of our era. As in Mongolia and Korea, and by way of Korea, metals were introduced suddenly into Japan, into the midst of an industry that remained on the whole at the Neolithic stage.

The multitude of islands scattered over the vast Pacific, becoming smaller and farther apart as they get more distant from their continental base, appear to be satellites of South-east Asia from the human point of view as well as the geographical, though prevented by distance and smallness from following the cultural development of that area. When men of our races arrived there in the last

few centuries—and even to-day in some places—the islands of Oceania were at a Neolithic stage, often very little developed. The present-day distribution of races and cultures points to a settlement brought about by successive waves extending further and further.

First came the Tasmanians and Australians, the most primitive type both physically and culturally—hunters and fruit-gatherers. Then the Melanesians, with the Papuans of New Guinea, the Kanakas of New Caledonia, and so forth, spread over the second zone. These were somewhat brutal races physically, with a Neolithic industry and a more or less developed agriculture and stock-raising. Finally the Polynesians (and the Micronesians) succeeded in peopling the sprinkling of islands that extend as far as Easter Island, four times as far from the Malay Archipelago as from America, though still nearly 2500 miles from the latter. These Polynesians, a superior and intelligent race, light in colour, seem to have been the greatest navigators the world has ever known. Their migrations are comparatively recent, and are kept in memory by oral traditions whose accuracy can be verified up to a point by comparing the number of generations indicated in various islands as starting from common ancestors.

Everything in Oceania is prehistoric, and for this living prehistory we have all the kinds of documents that are missing for our own: the study of material civilization, of social organization and beliefs, of somatic anthropology and linguistics—all these can and should be employed together.

By applying this principle Dr P. Rivet was able to make a useful approach to the problem—not purely an Oceanian one—of the peopling of America. He endeavoured to show that at least two Oceanian races, the Australians and the Melanesians, contributed to this process. The

presence of an Australoid type in the extreme south of South America seems to be attested by the work of various anthropologists (S. and G. Sergi, Lebzelter, etc.), and affinities of language and cultural connexions have also been adduced. The idea of Mendès-Correa should be

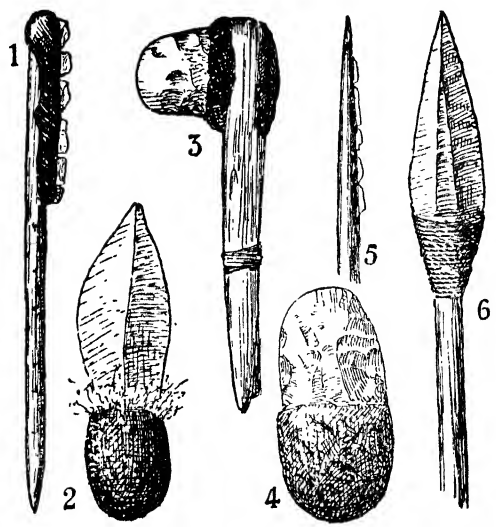

FIG. 51. STONE EQUIPMENT OF PRESENT-DAY AUSTRALIAN ABORIGINES

1, compound knife with quartz teeth; 2, sharp flake knife with gum handle; 3, axe with folded handle; 4, axe with handle at base; 5, compound arrow-head with stone splinters fastened in hard wood; 6, spear-head of sharp flake mounted with gum and string.

noted, that the Australian migration may have taken place along the shores of the Antarctic, whose climate was undoubtedly less severe than it is to-day.

"The Melanesian influence," writes Dr Rivet,

> which is far more apparent, is shown on the one hand by the prevalence of a hypsidolichocephalic type (Lagoa-Santo or Palæo-American type) in the whole of America from

Lower California in the north to the Argentine in the south, passing through the Pueblos region, Colombia, Ecuador, and Brazil, closely related to the Melanesian hypsidolichocephalic type, and on the other hand by the affinity between the languages of the Hoka group and those of Oceania, more particularly the Melanesian, and lastly by the extreme abundance of Oceanian cultural elements in the civilizations of the New World.

The author also enumerates so many of these elements that it seems impossible to attribute them all to convergences or rediscoveries. It is easy to understand the crossing from Asia to America in the northern hemisphere, not only by way of the Behring Strait and the Aleutians but also by the Kurosiwo Drift, the great current that flows from alongside the China Sea to the shores of California. What migrations have taken place—perhaps voluntarily, but more particularly involuntarily—since men first ventured in their frail craft on the mighty ocean!

Archæologists like de Nadaillac have long wondered at the close resemblances between the great pre-Columbian civilizations and that of ancient Egypt. The legend of Atlantis, recounted by Plato, was constantly adduced on this subject. More recently Elliot Smith and his school, Jackson, Perry, and Rivers, set out to show precisely these cultural resemblances and identities. English scholars have not hesitated to formulate very precise conclusions and to agree that Egypto-Phœnician migrations took place later than the year 900 B.C., reaching India, China, the Malay Archipelago, and finally the New World, bringing to the aborigines the 'heliolithic' civilization that was born and developed in Egypt since 4000 B.C.

It seems to us, on the contrary, that the facts in question are connected with a general expansion of the Neolithic world.

In recent years a group of Scandinavian and Central European archæologists, including Siren, Andersson, Janse, Heine-Geldern, etc., have shown the cultural connexions between prehistoric China and America, especially in the matter of pottery and art.

The American archæologist Hrdlicka has noted also that in the *kourganes* or funerary mounds of Siberia, among the peoples now living on the Yenisei and in Eastern

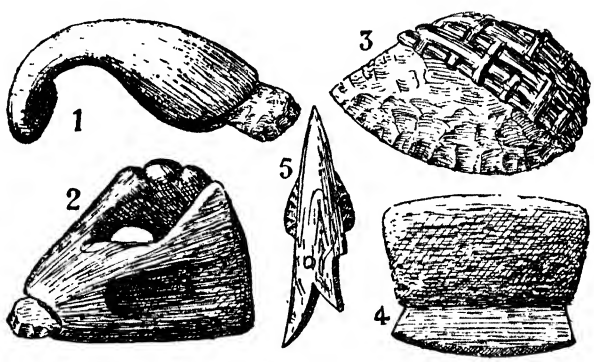

FIG. 52. STONE IMPLEMENTS OF THE ESKIMOS (RECENT)

1, 2, two types of hafted scrapers; 3, 4, two types of *ulus*: chipped leaf with plaited grip; sharpened schist blade with bone haft or grip; 5, harpoon-point of walrus ivory, mounted with leaves of chipped stone.

Siberia, are representatives of an earlier race, submerged by the others but identical with the Indians of America. And Nelson has found the Mongolian Neolithic industry in Alaska.

There is here a whole body of facts to be classified, connected, and elucidated by reference to each other. We can remark at once that as we move further and further eastward we constantly find connexions between neighbouring civilizations and races as far as and including America. This is true, however, only of the post-glacial

period in the north and of the post-Palæolithic period in general. Despite so much research, so much desire to discover, and so many over-hasty announcements of discoveries, it has never been possible to find clear traces of Palæolithic man in America. A negative fact, to be sure, is not absolute proof, but there is an increasing presumption that the New World, which has known no anthropomorphic apes, has also had no human inhabitants before the arrival of those who came from Asia and Oceania at a comparatively recent date by the ways we have mentioned.

It seems, however, that if America was a receptacle for the peoples of the Old World there was never a reverse movement. Without going so far as to claim that nature already applied the Monroe Doctrine, we can say that the double continent has acted as a trap. This idea is supported by the shape of Oceania and Asia, which taper off, as it were, towards America. Moreover, the land was so extensive and so rich in resources that there was no time for pressure of population to make itself felt sufficiently to cause people to leave it. When such pressure occurred in certain localities it led only to movements towards the interior of the continent.

A study of human development can therefore in theory leave out America, and we shall be compelled by lack of space to accept that theory here. But in practice a careful examination of American prehistory, of historical information since the conquest, and of the facts of present-day ethnography would be the most instructive preparation for the study of world prehistory. The human facts of which incomplete traces are found in the past of the Old World, from the life of the wretched fishermen and wandering hunters down to the great 'heliolatric' civilizations and the powerful empires with their complicated

social structure—all these things were found living, acting, struggling, and developing by the conquering Europeans. What a storehouse of comparisons and explanations for our own prehistory!

CONCLUSION

If we try, after this rapid journey round the world, to pick out the chief lessons of prehistory, we may remark in the first place that, however incapable it may often be of solving small local problems, it may yet hope to reach the broad outlines of truth. Starting from narrow beginnings it ought to widen its field. By putting man back in his natural place—the whole earth—where he obeys the laws that rule the living world, in which he has his part as the most highly developed of the mammals from the cerebral point of view, and by joining the various problems together, we note the disappearance of the incomprehensible anomalies and many of the 'insoluble mysteries' that appear in a narrow or fragmentary conception of the science.

All naturalists are agreed to-day that the creation of man was effected in the same way as that of the entire living world, and as the formation of each individual is still brought about—by the way of evolution or development. The 'how' of this development is sought after and discussed. The 'why' may be explained in matters of detail, but the greater 'Why' is outside the realm of the naturalists: it belongs to the Infinite, beyond the range of human concepts.

"Man," writes Cuénot, "is to the zoologist, and judged on the ordinary scale, a main or collective species similar to other main species such as *Canis*, *Rosa*, etc."

The stock from which this main species may be derived, and which has given rise also to the anthropomorphs, appears in full productive vigour in the Miocene in

Southern Asia. It is impossible, too, that man in the earliest stage of his creation, "naked and unarmed," could have lived anywhere else than in regions of a mild and warm climate where all the year round he could find the flora and the small fauna that were necessary to his existence. Since America appears to be excluded, the zone of possible origin is thus limited.

Whatever evolutionary process is envisaged the question arises: Where are we to place the boundary line between animal and man? Where does the human being begin, and what are his characteristic features? The problem is as difficult to the naturalist as it is easy in theory from the religious point of view, with its belief in the soul, as is shown by the many definitions that have been suggested. The most successful would seem to have been that of *Homo faber*, the being who can make tools. But if the existing anthropoids do not reach this stage there is no proof that it was not reached by rather more highly developed ones that have now disappeared. If, in particular, *Sinanthropus* is the author of the flaked quartz and the hearths of Choukoutien, is he to be regarded as a man? His external appearance would conflict somewhat with this "high dignity", and we should then call him a 'hominian' or a 'prehominian,' which accentuates the difficulty while trying to evade it. In any case there remains the fact that at the limit of the Quaternary there are beings morphologically intermediate between apes and men, and that, too, in Asia. Similar phenomena, though less precise as to geological date, have been observed in Africa.

Then we find traces of industry and skeletal remains of ancient humanity in the Early and Middle Palæolithic. It differs more from that of our own day than the most widely varying modern races differ from each other. Its

generic origins and those of its industry elude us. But we shall come across this industry, the Chelleo-Acheulian, with amazing uniformity, spread over a vast area from England to the Cape and from the Atlantic to the Malay Archipelago, by way of Italy, the Mediterranean Levant, and India. Of the corresponding race we know next to nothing, but it seems connected with the phase that followed that of the Mousterian industry, namely, the Neanderthal race, on which we are fairly well informed. Skeletal remains of this early form of humanity, amazingly similar to each other, or at all events at the same stage of morphological development, have been found from Northern Germany to Gibraltar, Palestine, South Africa, and Java. Industries of this Palæolithic period, very similar to one another, are met with throughout the whole of the Old World, including the north-eastern zone of the Eurasian continent which, from Germany to China, had no Chellean industry. In this zone the industries of Mousterian type no doubt occupied both periods.

This early form of humanity was suddenly succeeded by another whose origin eludes us. This time it is our own species, somewhat presumptuously named *Homo sapiens*. When first met with it seems to be divided into many races. Its industry, the Upper Palæolithic, differs from earlier ones in having more delicacy and variety, but has no overwhelming superiority. The chief thing is the appearance of representational art. The mode of life is still of the simplest: hunting, fishing, and fruit-gathering must suffice for everything. The important line of division, therefore, is only in specific characteristics and also, no doubt, in certain intellectual features, as is indicated by the development of the artistic sense.

The great change that followed, on the contrary, affected the whole mode of life. Neolithic man became

an agriculturist and shepherd, escaping from the life of the wild beast in which he had nothing to eat if he was unlucky in the chase. Having brought the vegetable and animal kingdoms under control for his own benefit, he was able to remain fixed to the soil. He could "increase and multiply," and he formed large groups, organized by division of labour and a hierarchical system, while his beliefs and his form of worship changed with the new manner of life. He invaded the whole earth, including that part of the Far East which had long escaped him. Technical improvements were gradually introduced, first and foremost being the discovery of metals, and then the continued development of their use. The world of the present day began to take shape. It was divided into groups, progressing at very unequal rates and reacting more or less, at different periods, on their neighbours, as we see later on in the light of history. But the continuity of the Neolithic world down to our own times, despite all confusion in matters of detail, is a striking fact.

Next comes the present period, bringing with it a new upheaval in the conditions of human life, comparable only to that created by Neolithic progress. This time it is the world of inanimate forces that man has succeeded in harnessing for his service by mechanical means. The consequences are already visible. The new possibilities have provided the peoples who have discovered them with the power and the need to expand. They are invading the entire world and spreading their material organization by fair means or foul. The backward races have no time to develop, but are transported straight into the new world or else destroyed by rough contact with it. Henceforth, in a few decades or centuries the human race will have been levelled out, broadly speaking, in its manner of life, and all the most primitive races (Tasmanians,

Australian Aborigines, Pygmies, Melanesians, etc.) will have disappeared.

The historic period is too short to show us this cycle in its entirety, and does not even permit us to suspect its existence, but prehistory shows it several times repeated —development with progress and local differentiation, whence arise varieties and differences of level. Then progress of a higher order appears somewhere, leading to such disequilibrium that a general movement is produced—a veritable tidal wave that submerges the old order of things and leaves a world at one level, except sometimes in extremely small patches. Thus appear the great stages that we have indicated: (1) the seizure of the Old World by Chellean and Neanderthaloid man; (2) the total replacement of the latter by races of *Homo sapiens* with a culture that includes artistic tendencies; (3) the elimination of part of these races and the replacement of their mode of life by the Neolithic civilization, agricultural and pastoral, levelling out the Old World and spreading over America; (4) finally, in our own day, a new levelling process by the civilization of the machine age, accompanied by a new elimination of the inferior races.

We may observe, as we end this brief study, that the "natural and primitive history of man" alone permits us to set in their right place, to see in true proportion, and at least in part to understand, the mighty facts that concern our species. In spite of enormous gaps this science of prehistory has at its disposal a method and sufficient material to make its main outlines and its principal teachings already clearly apparent. It deserves a high place —which has not yet been accorded to it—for it gives to man the surest means of reaching the goal set before him long ago by the sages—to know himself.

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